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Railroad Car Brake.

The improved brake illustrated in our engravings is more especially adapted for use on four wheel coal cars, or such ore cars as are generally used about furnaces, though it admits of various modifications of its arrangement which would adapt it to other forms of car, without altering the principle involved.

It was invented to supply a case of necessity. In January, 1871, a gravity road was built in New Jersey, for the purpose of carrying iron ore from the mines to the Delaware, Lackawanna and Western Railroad. This gravity road was between 2 and 3 miles long, having a uniform grade of over 200 feet to the mile, with no level places on which to brake up a train. The cars used would weigh about 5 tons when loaded, and were equipped with the ordinary lever brakes, such as are used on many of the four-wheel coal cars. In less than a month every car "got away" from the brakemen, ran to the bottom of the grade and there smashed up. It was found unsafe to let two men go down the grade, with a train of only five cars.

Fig. 1.

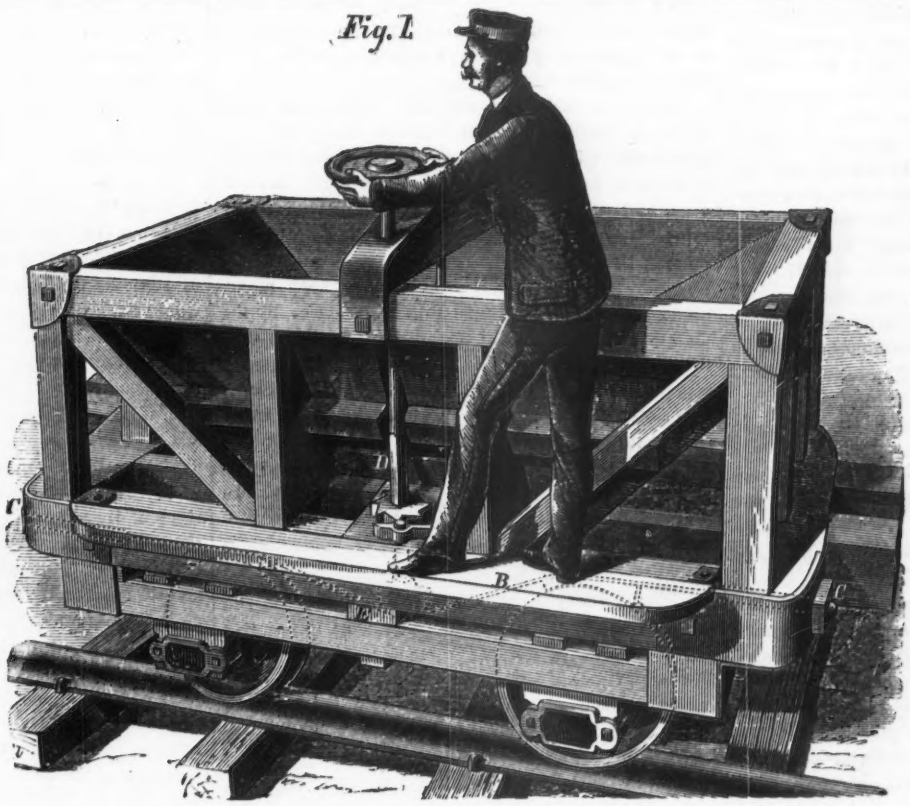
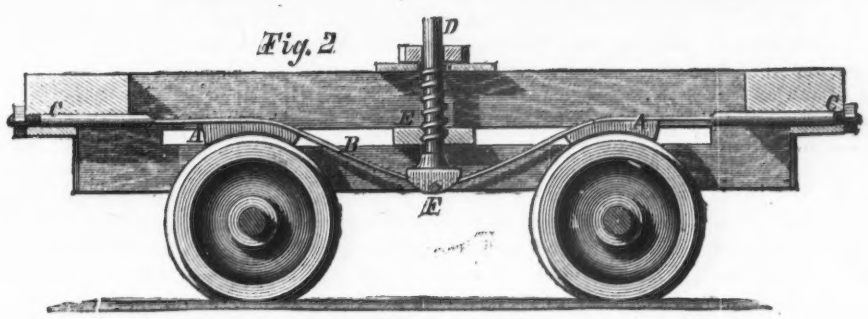


Fig. 2.



CANFIELD'S IMPROVED RAILROAD CAR BRAKE.

In the February following, one of these screw brakes was applied to a car, and this car was kept at the front end of the train, as a guard to the others. With this single brake it was found possible to stop the train of five cars, whenever and wherever it was desired. This one brake did all of the braking for these five cars until the following July, when the other four cars were similarly equipped, since which time the railroad company introduced this brake on all (30) of their cars, and they have yet to report the first accident, or runaway, occurring through fault of the brakes. A boy fifteen years of age manages any number of cars with the greatest ease and safety. Brake No. 1 has been in constant use from the time it was first applied (Feb. 6, 1871) until the present time, and as yet shows no appreciable wear.

It will be seen from the wood cut, that there is nothing about this brake that can be bent, wrenched, strained or broken. Every part pulls, or pushes, direct.

The screw is made of such a length that it can be run down until the shoes are entirely worn out.

It costs about $3.00 a year to keep these 30 brakes in order.

Fig. 1 represents a coal car with the brake applied to one pair of wheels. Only the upright shaft and hand wheel are shown in the engraving, the other portions of the brake being indicated by dotted lines. Fig. 2 shows the side frame of the car, in section, with the brake attached. At A are shown the brake blocks, which are made of wood or other suitable material. These are attached to a flexible iron strap, B, the ends of which are secured to the frame of the car by the nuts and screws shown at C. This strap is about three inches wide and a quarter of an inch thick. D is a vertical brake rod which is operated by the wheel seen in Fig. 1. On the lower part of the brake rod is a screw which works in the nut, E, attached to the frame of the car, and on its extreme end is the block, F, which has a groove lengthwise through which the strap passes. It is kept from falling out by a pin. The end of the brake rod works in a socket in the block in such a manner as to raise or depress the block without turning it. When it is desired to apply the brakes, the rod is screwed down by means of the wheel, and the strap is carried down with it. This brings the blocks, A, in contact with the wheels of the car and throws part of the weight of the car upon the brakes. The amount of pressure applied to the brake block by the brakeman is dependent upon the pitch of the screw on the rod, D, and upon the diameter of its wheel. When the brake is not in use, the rod, strap, and brake blocks are elevated sufficiently to relieve the wheels of all restraint. Should the strap stretch, it may be easily brought to the proper tension again by tightening the nuts at C.

It will be noticed that the brake blocks are applied directly on the top of the wheels, which prevents the strain coming upon the boxes as it does when they are placed in any other position. The brake appears to be durable, and costs only an insignificant sum to keep in order. For further information the inventor and patentee, Mr. FREDERICK A. CANFIELD, of Dover, N. J., should be addressed. Patented Jan. 9, 1872.

Cement Mixture for Steel.

Mr. EDWARD F. HOUGHTON of Philadelphia proposes to use a combination of bone-carbon and hydrocarbon oils, as a cement mixture for the manufacture of steel. The object of the invention is to convert iron into steel economically, and to utilize the waste bone accumulated in the process of manufacture of the article known as cosmoline. The bone carbon is impregnated with hydrocarbon oil. The wrought iron is case-hardened by immersion in the

described bone carbon, heated to redness. The surface of the iron is of extreme hardness, and the metal is not blistered—a desirable feature in finished work.

The Amalgamation of Gold Ores.

BY JOHN A. CHURCH, E.M.

[*Concluded.*]

Before leaving this subject, it may be well to inquire how it is that gold is amalgamated on copper plates in Colorado, where of course there is no mercury bath. All experimenters, I believe, have agreed that more than half the amalgam that is obtained, is made in the battery, and the plates placed there collect the larger part of the gold saved. Probably still more comes in contact with the mercury within the battery, and issues from the screen with the surfaces of the gold particles covered with mercury, or a true amalgam of gold and mercury, which gives them a greater power of adhering to the coat of amalgam on the plates. One of the signs for which the amalgamator constantly watches is, in fact, the appearance of hard dry particles of "amalgam," which he knows by experience are apt to pass over the plates without adhering. He adds mercury to the battery, and the particles then come out with a softer coat, and readily fix themselves to the plate. The success of the plates as amalgamators is also greater when there is a thick coat of soft amalgam on them, and all these facts point to the supposition that the gold is retained on the plates by virtue of the cementing properties of the mercury with which it becomes covered in the battery, rather than by its instantaneous solution in the amalgam of the plate.

Mr. REICHENECKER, in describing the Colorado milling processes, points out :

1. That the inner plates "take up" more gold than the outer, because the intermittent action of the stamps allows slight periods of rest to the slime within the battery, so that the gold particles have opportunity to settle.

2. That the mercury which passes through the screens contains very little gold, and is thinly fluid, while the amalgam on the plates is pasty and hard.

3. That the amalgam on the plates is formed by gold which comes through the screens, not dissolved in the mercury, but floating in the pulp.

In the battery are placed all the materials—ore and mercury—which are necessary to the operation. The stamps distribute both, but mostly apart, not united in an amalgam. Part of the gold adheres to the inner plates, where it would form a very hard, and perhaps intractable, surface, were it not that part of the mercury follows it, and thins the otherwise hard amalgam. This action is repeated on the outside plates. The gold adheres to the amalgamated surface, and would form a hard layer were it not that the mercury comes to cover and thin it.

The coating of amalgam is thickest at the head of the plate, next the battery. This state of things is exactly duplicated in the Austrian mill. In this machine the amalgam collects about the central axis of the mill. Where the gold first strikes the mercury, there it settles, and forms a mass which can be taken out by the fingers—a phenomenon which occurs nowhere else in the mill. It must be remembered that in the Austrian mill there is a large bath of mercury —quite enough to thin to an excessive degree any amalgam formed, were mercury capable of thinning or dissolving it. But we have, in the centre of that bath, a deposit of hard amalgam, lying in a sea of liquid mercury. It does not appear, then, that mercury can dissolve amalgam as water dissolves sugar. It cannot even thin it, except to a certain degree.

In connection with this subject, the results of the Washoe system of amalgamation have great interest. In the pans which are used for working the ore, it is well known there is no bath of mercury, but this metal is distributed through the pulp in small drops, the object being to secure not only thorough contact of the mercury with the silver minerals, but also to maintain this contact long enough to have chemical action set in. To run sulphide or even chloride of silver over mercury, as gold is run over a bath of that metal in the Austrian mill, would not answer.

But the Comstock ore contains gold as well as silver, and the Washoe system secures a very good proportion of it—as much, probably, as any amalgamation will extract of gold that is not positively fine.

The following results, taken from Mr. HAGUE'S book, are calculated upon a great number of samples of Savage ore, representing in all 133,844 tons of third class, and 5,109 tons of second class ore. The bullion from third class ore contained 32.4 gold and 67.6 silver ; and that from second class ore, 36.7 gold and 63.3 silver. So that gold is really saved in the Washoe pans, and they seem to work, in fact, better than the Colorado mills, for they extract no less than 81.1 per cent. of the gold and 64.6 per cent. of the silver estimated on the mill samples. How is it that gold can be taken up when the mercury is in fine drops all through the pulp and there is no opportunity for its mechanical action as a fluid of medium density ?

Though no examination of this subject has been made, it is probable that the bulk of the gold is obtained, either in the settler where the pulp is thinned or in the agitator where it undergoes still greater thinning, and where the conditions are in fact extremely favorable for collecting the gold at the bottom, and entirely by mechanical means. There it meets with mercury, and follows it in its subsequent movements. Undoubtedly some gold is taken up by the mercury, while the latter is still distributed through the pulp. But the conditions under which mercury separates this metal from its ores, as well as direct experiments with gold, bearing pulp in barrels, teach us that this cannot be a very large proportion of the whole. It is indeed a very small proportion, and fortunately there is an analysis which proves this. In the chapter on the chemistry of the Washoe process, we have the following analysis of some amalgam *crystals* given :

Mercury	75.04
Silver	24.18
Gold	0.77

The proportions of silver—95.5, to gold—4.5, are here, it will be observed, very different from those found in the bullion of the third class ore spoken of above, and which was, silver 67.6 and gold 32.4.

In working the small pan, used in making the experiments upon which the chapter upon the chemistry of the pan process is based, it is to be noted that no such proportion of gold to silver was obtained as that which occurs in the regular returns of the Savage company. In working first class Savage ore the bullion contained gold 49.5 to silver 934.7, and yet the yield was 70.6 per cent. of the gold and 32.55 per cent. of the silver. Had the yield of silver equaled that of the gold, the proportion of the latter would have been less than half what it really was. Probably in working in the large way, gold collects in the bottom of the agitator, and is taken up by the mercury of the *next* charge of pulp, a state of things that could not exist in the experiment, because the apparatus was there thoroughly cleaned after each run.

Within a few weeks an able chemist (Mr. COLVER, of Albany) has given to the world the results of investigations into the nature of amalgams. As might be expected, his attention was directed to the chemical phenomena exhibited by these compounds, and he has detailed some very interesting and valuable experiments. These go to show that the chemical activity of the amalgams of certain metals is so strong toward gold, that they even exert a magnetic influence upon that metal, when held near them. They draw it as the magnet draws iron, but with much less power and through much smaller distances.

It remains to be proved that the conditions under which the amalgamation of gold in ore is practically effected, are such as to take advantage of this magnetic power of amalgams. We may indeed reject it from our calculations, for the experiment proved that *copper* amalgam, the only one in general use, had no effect until the gold was in actual contact with it.

In looking at the whole subject, it does not appear that we ought to neglect either the important influence of the law of gravity, or the affinity of the two metals for each other ; or as the new chemistry has it, the *chemism* of the metals. We know that the latter cannot act until the former has done its work. But when gravity succeeds in bringing the gold down to the mercury, the influence of chemism is apparent in the rapid action of the fluid upon the solid metal.

To the amalgamator, however, gravity is the important subject for consideration, because that is the element in success which he can improve. Chemism is always with us, and we can do but little to increase its action. But gravity we can help along. We can improve our machines, until we have those, through which the ore passes with *minimum* velocity, in which the slime has a *maximum* rest and a *minimum* turbulence, in which float gold will be able to sink, and, in short, which by making the operation of gravity perfect, will also present the best conditions for the operation of chemism.

It may be said that these conditions have always been the aim of millmen. That is true to some extent, but they have too often proceeded on the supposition that if they could bring the two metals once in contact, for however short a time, their union would be secured through the powerful operation of chemism. In looking over the machines that have been invented it can hardly be doubted that some of them would never have been offered to understanding men if it had been an acknowledged principle that *rest* and *weight* were necessary factors in good amalgamation.

There are machines in existence in other operations of dressing ores which secure perfect contact of the ore and the surface over which the slime flows, by so thinning the stream that the particles of ore at length rest bodily on the table, and remain there until they are removed by especial means. So far as I know, these machines have not yet been adapted to amalgamation. It is reasonable to suppose that such constructions, securing as they do, actual contact of every particle of the ore with the table, would give better results than any other, for in them gravity is permitted to exert its utmost power. If they can be adapted to copper plates, one-half of the work will be well done ; while the other half—the action of mercury—in most cases never fails.

The Largest Nickel Mine in the World.

Last week, says the *Industrial Age*, we took occasion to correct the erroneous statement of one of our city papers, which stated that the only nickel mine in this country was in Pennsylvania. We mentioned the fact that nickel had been procured from Mine-la-motte, Mo., for use at the Philadelphia mint in making the lesser coin, as well as in making plated and solid ware.

We learn from parties who recently visited that locality, that the company have recently thoroughly explored an area of more than an acre in extent to a depth of five feet, and in no place has the diamond-drill passed through the nickel deposit. This bed of nickel and copper is known to average more than five feet in thickness over this area, and how much larger the area or how much thicker the stratum is unknown.

Our informant states that this material—nickel and copper—is worth *six hundred dollars per ton*, and that arrangements are on foot for working the mines vigorously, and shipping this produce to England.

While we cannot vouch for all these statements, we know that the nickel vein had been prospected upon, and nickel found to extend, more than a year ago, a distance of a quarter of a mile beyond where the mine had been opened and worked, hence we

have no reason to doubt the correctness of the report.

Since it has been practically demonstrated that nickel is far superior to any other metal for plating iron, steel, brass, or copper—that it is harder, retains its brilliancy longer, and is not affected by rust, acids, sulphur, or other gases—and inasmuch as the number and capacity of establishments for using this valuable metal are so rapidly increasing in this country, we see no good reason why a company should not be formed here for preparing this nickel in merchantable shape.

As stated last week, considerable of the lead mined at La-Motte is intermixed with nickel ore, and for many months past no use has been made of the nickel. We have since been informed that the residue of the lead furnaces contains considerable quantities of nickel, and that the cinders are used for improving the roads throughout the company's extensive property, hence the assertion that "the roads at Mine-la-Motte are nickel plated."

We hope the day is not distant when this mine of wealth will be properly developed and utilized, with great profit to the owners and the "coming men," and prove a credit to our mineral State.

Researches on the Consumption of Heat in the Blast-Furnace Process.*

BY RICHARD AKERMAN.

Translated by FREDERICK PRIME, Professor of Metallurgy in Lafayette College, Easton, Pa.

The attention now being paid both in this country and Europe to the greatest economy in the working of the blast-furnace, and the eagerness with which all thoughtful men in the iron business look for any new information which will tend to throw light on this subject is a quite sufficient excuse for presenting this paper to the American Institute of Mining Engineers.

I. It must be borne in mind that when two bodies unite to form a chemical compound, heat is almost always evolved. In order to measure the quantity thus evolved, that amount of heat is used as a heat-unit, or caloric, which is able to raise one pound of water, one degree Centigrade. So that, when it is said the heat evolved by carbon, when burnt to carbonic acid, is 8,080 heat-units, it is understood that by the combustion of one unit by weight (1 lb.) of carbon, to carbonic acid, sufficient heat is produced to raise one pound of water 8,080 deg. C., or what is the same, to raise 8,080 lbs. of water 1 deg. C. In the combustion of one pound carbon to carbonic acid, we find that $32 \div 12 = 2{,}667$ lbs. oxygen unite with the carbon. But we can also speak of the heating power of carbon, reduced to the unit by weight (1 lb) of oxygen, by which we understand, not as in the preceding case, the amount of heat produced by the combustion of 1 lb. of carbon with 2.6667 lbs. oxygen to carbonic acid, but that amount of heat evolved when $12 \div 32 = 0.375$ lbs. carbon combine with 1 lb. of oxygen, to carbonic acid. The heat evolved by carbon when burnt to carbonic acid per weight-unit of oxygen, is therefore $0.375 \times 8{,}080 = 3{,}030$ calorics. It is well known that, as a rule, one body unites with another to form several different chemical compounds, which fact is also true of carbon. This not only combines with oxygen to form carbonic acid (CO_2), in which one equivalent (12 parts by weight) of carbon unites with two equivalents (32 parts by weight) of oxygen, but they also form carbonic oxyd (CO) in which one equivalent (12 parts by weight) of carbon combines with one equivalent (16 parts by weight) of oxygen. The amount of heat evolved by carbon, per weight-unit, for these two stages of oxidation, is in the highest degree dissimilar, so that while 8,080 cal. are evolved by its combustion to carbonic acid, when burnt to carbonic oxyd, it only develops 2,473 cal. But while, on the one hand, the heat of carbon by its combustion to carbonic oxyd is so low, so much the greater is the heating power of the carbonic oxyd by its combustion to carbonic acid, on which account the same amount of heat is always evolved, when a certain quantity of carbon is first burnt to carbonic oxyd, and this then to carbonic acid, as when the same quantity of carbon is burnt directly to carbonic acid. By the combustion of 1 lb. of carbon to carbonic oxyd 2,473 cal. are evolved and thereby $(12+16) \div 12 = 2.333$ lbs. carbonic oxyd formed. And since the heating power of the carbonic oxyd, by its combustion to carbonic acid is 2,403 cal. per weight-unit, we must obtain by the combustion of 2.333 lbs. carbonic oxyd a heating-power of $2.333 \times 2.403 = 5.607$ cal., which together with the 2.473 cal. first produced make 8,080 cal., the same amount of heat, which would be obtained by the direct combustion of 1 lb. of carbon to carbonic acid.

The heating powers of the various elements have been for the most part determined by direct experiment. On the other hand, it is an undisputed axiom that by the decomposition of a chemical compound of two bodies, as much heat is absorbed, or rendered latent, as was evolved when the compound was formed. If, therefore, $(12+32) \div 12 = 3{,}666$ lbs., carbonic acid are resolved into one pound of carbon and 2,666 lbs. oxygen, the 8,080 cal. must be absorbed, or in other words a cooling corresponding to 8,080 cal. must take place. From this axiom and the previously adduced fact, that the same amount of heat is evolved if a certain amount of carbon be burnt directly to carbonic acid, or first to carbonic oxyd and then this to carbonic acid, it necessarily follows that if one pound of carbon be burnt to carbonic acid ($CO_2 + C = 2CO$) that the final difference between the amount of heat evolved and absorbed must be equal to the amount which would be obtained by burning two pounds of carbon directly to carbonic oxyd.

II. It is of the greatest importance to distinguish accurately between the amount of heat, which is expressed by the number of calorics, and the temperature (intensity of heat), or measurable heat, which a body possesses. If, for example, a vessel contains 10 lbs. of water of a certain temperature, (say 15°C.,) then the water possesses 150 cal. above the freezing point. If 2 lbs. of this water are poured out, the remainder in the vessel still retains the same temperature, but possesses only 120 cal. since 30 cal. have been removed with the water poured out. The temperature or measurable degree of heat of a body depends not only on the amount of heat imparted to it, to which it stands in direct proportion, but is also dependent on the quantity or weight of the body in question, with which the desired temperature is in inverse proportion.

III. But even when like amounts of heat (an equal number of calorics) are imparted to equally large weights of two different bodies, these do not have the same increase of temperature, the reason for which is, that different bodies have different specific heats. By specific heat is understood the number of calorics which are necessary to raise one pound of any substance 1°C in temperature. The specific heat of water is taken=1. If we state that the specific heat of oxygen=0.2182, it is understood that just 0.2182 cal. are necessary to raise one pound of oxygen 1°C in temperature. From what has been stated it can readily be seen that in order to correctly determine the amount of heat of any body, not only its temperature, but also its weight and its specific heat must be known, and that the amount of heat, imparted to the body in question, is determined by the product of these three numbers.

IV. It is further to be remarked, that by melting-heat is understood the number of calorics necessary to convert the weight-unit of a solid body to the fluid state without any increase in temperature. And also by gaseous or gasifying-heat is meant the quantity of heat necessary to convert a liquid body to the gaseous state without causing any increase of temperature.

TO BE CONTINUED.

* Read before the Institute of Mining Engineers, May 21, 1871.

The International Bridge.

A correspondent of the New York *Herald* gives the following account of the caissons for the International Bridge, and the process of sinking them:

"Otto Meyer, of New York, was engaged last winter to construct and sink coffer dams for these three piers. He has been for six months preparing a coffer dam of his own, length 125 feet, width 32 feet, and depth to suit the river, 36 feet, for pier No. 6. It is sharp on both ends; has double sides, closing at the bottom, forming a space three feet wide around the sides for depositing stones, leaving the center of the coffer dam open for the caissons in which the pier is afterward built. The largest anchors, and chains from the navy yards of New York and Montreal were secured, through the kindness of the different departments, and on the 16th instant Captain MEYER'S "ship without a bottom" lay moored before eight of the most weighty anchors and chains that have ever gone through a forge, six feet above the position of the pier to be built. At 1 P.M. preparations were made for sinking. Several hundred tons of stone were thrown in the apertures on the side of the coffer-dam until it had sunk within eighteen inches of the river bed. A number of barrels had been arranged previously under water and fastened on the woodwork, their boyancy lifting the structure about two feet; these were all held by one rope, which being cut, caused the barrels to float and submerge the coffer-dam deep enough to strike the bottom. Six very heavy iron-pointed posts or "spods" running through sheaths or sockets, three on each side, were hoisted and ready to drop.

At four P.M., everything being ready on shore and on board, the craft was quietly let "down stream" by her anchors until the engineer on shore signalled "in position." The flag was raised "all right," and with the order "Cut away," the barrels floated up, the iron spods dropped, burying themselves in the river bed, and with a light shock the coffer-dam rested securely on the bottom of the Niagara, on a deposit of gravel and stones. The gravel and stones have to be removed by a dredger, ready here for the purpose, and superintended by Mr. W. W. Collins. Below the gravel the solid rock is found on which the piers are to rest.

Tin in Australia.

They are more successful in Australia, in their hunt for tin ore, than we in the United States with all our alarms. Tin ore is what is called "a fixed fact" there. About 25 tons have been shipped from the Mount Mitchell mine, and 10 tons, the produce of the Inverell district. Several tons have also been forwarded from the Ruby mine. Not less than 26,621 acres have been already taken up as tin selections in the Darling Downs district. In the Inverell and Armidale districts large tracts of country have also been selected. At the Elsmore mine everything is ready for the erection of heavy machinery. A gentleman engaged in the Victoria Government mining department was sent recently to report upon the tin mines in the New England district. Since his return he has stated his belief that its deposits of stream tin are richer than those of any other part of the world, and instances the Elsmore mine as being richer than any mine in England.

The Vulcan Iron Works, St. Louis.

The Vulcan Iron Works were established in the early part of 1869 for the purpose of making pig iron from bituminous coal, the original capital being $150,000. This was soon increased to $250,000, and subsequently again considerably increased. Two large furnaces were soon in successful operation, of 14 feet bosh and 60 feet high, with large casting house and stock sheds, and the most approved machinery. In a short time a large rolling mill was erected for the manufacture of railroad iron, and the works, now firmly established, rank among the largest of the kind in the country, the two furnaces producing from 500 to 600 tons of pig iron per week, and the

rail mill making 40,000 tons of rails per annum. The company now contemplate the erection of a Bessemer steel rail mill, with a capacity of 140 tons of steel rails per day. The present rail mill, with its puddle and re-heating mills, contains 55 puddling and beating furnaces; 3 trains with housings for 24 inch rolls; 2 break down trains; 2 largest size squeezers; 3 large engines 36x40 with 50 ton fly wheels to each; 10 other engines of various sizes; 4 doctors of the largest size made; saws, punches and presses of the heaviest patterns. Their forge or blacksmith shop contains 6 fires, lathes, drill press, &c. There is also a large pattern shop overhead. In the furnace engine house they have one vertical engine, steam cylinder, 34 inches in diameter by 7 feet stroke, with 26 ton fly wheels; and they have just completed the erection of a huge engine 47 feet high from bed plate to summit, surrounded by winding iron stairway and galleries, steam cylinder 60x108 inches and blowing cylinder 108x108 inches, being the largest engine west of the mountains; it will blow 22,000 cubic feet of air per minute, will largely increase the produce of their furnaces, and furnish blast for a third furnace. The quality of their rails is so well known amongst railroad men, that they are always full of orders at the highest current prices, and their pig iron is largely in demand for stove plate and general machinery castings. They also make a grade of iron known as "Bessemer Pig Iron," which is now shipped to both Chicago and Cleveland steel works.—*Iron World.*

Impure Water in Steam Boilers—A New Theory of Explosions.

The Cincinnati *Commercial Bulletin* says:]

There is a universal demand that something shall be done for the furtherance of the security of life and property from the dangers of steam power. Heretofore but little has been done—and that only spasmodically upon the heels of some dire calamity—to discover the actual causes of many of these explosions. Boiler owners and the public have generally been content to take the positive assertions of a class of engineers who never traveled out of a rut, and the filmy theories of dreamy speculators who travel in, if possible, a deeper rut than their fellow impracticables—the unobservant engineers. These assertions are limited upon the one hand to the supposition that boilers cannot be exploded as long as a full gauge of water is maintained, with safety valves free, and that, given "a competent engineer" and "good iron," there is no danger. Happy for the world would it be if these were the only difficulties, as they are all controllable causes, but, unfortunately, boilers continue to explode despite the watchful care of the most skilled and trusty engineers, full gauges of water, reasonable pressure of steam, and the best of boiler metal. They explode, too, when circumstances leave no doubt that none of the above thoughtful and wise provisions could have averted the disasters—tearing the best metal into shreds and hurling entire boilers to great distances, with a force seemingly far beyond the power of steam.

The theorists have deluged the public with a variety of speculations, but sadly fail to substantiate their assertions by facts or experience. The "globular" or "spheroid" condition which water is capable of assuming was a notable and, for a time, a popular instance; but as the conditions, a red hot metal, is impossible within a steam boiler while the water is in contact with the iron, it is evident we must look further for the cause.

The explosion of the fated Moselle, which blew up near this city in 1838, with the loss of 200 souls, has never been satisfactorily explained. Low water has been assigned as a cause, yet we know of an instance in this city in which the water leaked out, and the boiler got red hot while still under the pressure of steam; nevertheless the water utterly refused to "spheroid" or suffer itself to be decomposed into its constituent gases. Old engineers know of plenty of such cases.

Neither is high pressure a requisite of a first-class explosion. The propeller Globe arrived in Chicago harbor in 1860, at four o'clock in the morning, with 80 pounds of steam. The fires were allowed to die out, and at 11 A. M., with only *ten pounds* of steam she blew up, utterly destroying the boat. Explosions at low pressure are common occurrences, of which the New York ferry boat, the Westfield, is still fresh in our memories. Only twenty-seven pounds of steam being required to tear the boiler and boat into fragments and send nearly a hundred souls into eternity.

Neither is bad iron a sufficient source of explosions to account for many of these disasters. The railroads running into our city have furnished more than a few instances in which locomotive boilers, containing from 100 to 150 flues, and consequently difficult of frequent examination, upon going into the shops for general repairs, have been discovered with sections of the boiler corroded until a mere shell as thin as a sheet of paper was all that held the water, and 100 to 130 pounds of steam pressure. These boilers thus weakened did not explode, yet new locomotives just from the makers' hand have exploded at ordinary pressure.

Something beside "bad iron" must account for such cases.

From this hurried glance at the astonishing facts that confront the earnest seeker after truth, it will be readily seen that within the iron walls of the steam boiler, as ordinarily used, there is a mysterious power which science, experience, and prudence have generally overlooked. Hence the folly of stocking the coroner's jury with men who know nothing about steam power—a notable case of which was had in the case of a disastrous explosion in this city this year. As long as the verdict comprises nothing beyond the customary condemnation of the dead engineer, the hap hazard censure of the boiler maker, and the reiteration of the stale assumption in regard to "low water," "over pressure," etc., we can look upon such only as a stigma upon the intelligence and common sense of this age.

To what, then, may we assign boiler explosions?

That bad iron, low water and over pressure are unfavorable to safety cannot be denied. Many boilers *burst* from these causes. But *bursting* is not *explosion*. The former consists in giving away of a weak part of a boiler and letting out water and steam, or both, as the case may be. Such occurrences are numerous and are not generally attended with very serious results, except to scald any person in the line of the escaping hot water and steam, or both. The boiler is seldom moved from its place nor torn much in its weakest parts.

An explosion is diametrically opposite in its nature. The boiler gives way regardless often of its weakest part. The strongest boiler plate is torn into ribbons, and the boiler itself, or huge masses of it, hurled to great distances with an indescribable force.

There is a growing belief in the minds of practical and observant engineers and machinists, as well as some of our best experts, that impurities in the feed water are a very important source of danger which, strangely enough, has been almost entirely overlooked.

Water is a natural compound of oxygen and hydrogen, and will produce the same effect from the same cause every time; for instance, it will solidify at 32° Fahr., and at an elevation of 531 feet above the sea it will boil at a temperature of 212° Fahr., and just as we increase the pressure we must raise the temperature to produce the same effect.

While this is true of pure water, it is far different with waters containing impurities, or foreign substances. Even the presence of mechanical matter—that is, matter not in true solution—will greatly vary the conditions of evaporation. Take two vessels, one containing pure water and the other with a few grains of sand; one will evaporate steam with the usual currents or movements of the water, while the vessel into which the sand had been introduced will suffer violent ebullition. Water containing alkali and greasy substances will display some very singular phenomena.

Some molten iron was accidentally dropped into a trough of dirty water, in which the workmen of a railroad machine shop had washed, using soap freely. Instantaneously there was a flash—an explosion—the mass flying upward to the roof. The experiment was repeated many times. When the hot metal was dropped into *pure* water no explosion ensued, only a sizzing and bubbling of the waters of the escaping steam.

River and harbor water is loaded with organic matter and earthy salts. A chemical analysis of the Mississippi river water, taken below the mouth of the Missouri, showed, among other impurities, nearly six grains nitrogenous matter (albumen) to the gallon, and with the presence of the fats or oils, and alkalies, derived from decomposing animal and vegetable substances, might be set down as extra hazardous at high temperature. High authority says: "The instability of all nitrogenous compounds is the striking peculiarity." These elements are held together by the most fickle affinities, and have a proneness to decomposition whenever deranged by heat or other molecular disturbances.

Glancing at the Ohio river we find its banks lined with populous cities and thriving towns, all emptying their sewerage—pork and slaughter-house drainage, gas and petroleum refuse, etc., etc.—into the one common channel. The rains that feed the river sweep over the vegetation of the Ohio Valley, absorbing its juices, and washing down the decaying animal and vegetable matter. The nitre beds of Kentucky and mineral products of all contiguous States furnish their quotas to the great "mixture," which is pumped into both stationary and steamboat boilers. If such impure water will, in the chemist's laboratory, display remarkable explosive powers, is it not reasonable to suppose that when subjected to high temperature in steam boilers it may manifest similar phenomena.

Every new boiler when it first comes from the shop contains more or less oil and grease, and for a few days the water "foams" furiously—and every engineer knows that in times of freshet, when the waters are freighted with animal and vegetable matter, there is much annoyance from "foaming," and the gauges often fail to show the proper stage of water in the boiler.

American Institute of Mining Engineers.

OFFICIAL BULLETIN.

Announcements to Members and Associates.

I. The dues for the year ending May, 1873, are now payable. All members and Associates who have not paid their dues are requested to do so at once, by sending in postal orders, or checks, or money, ten dollars to the Secretary.

All members and Associates who pay their dues for each current year, strictly in advance, will have sent to their address, regularly and weekly the ENGINEERING AND MINING JOURNAL, which is the organ of the Institute, and will contain the proceedings and transactions, and all important papers read before the Institute and all notices of meetings. Back numbers cannot, as a general rule, be sent.

II. It is expected that the more important papers read before the Institute, and the debates thereon, will be published in annual or occasional volumes to which those Members and Associates will be entitled who have paid their dues.

III. All authors of papers are requested to notify the Secretary in advance of the meetings, giving the subject and length of their papers. Attention is also called, in this connection, to Rules 12 and 13.

IV. The ninth rule has been amended, so that there will be hereafter three meetings a year in February, May and October. The meeting next October will be held at Pittsburgh, Pa.

MARTIN COBYELL, Secretary.

Wilkesbarre, Pa.

THE COAL TRADE.

NEW YORK, August 9, 1872.

Dealers see a grain of comfort in the suspensions in the Schuylkill district. These have been quite numerous and have had considerable effect upon the out put of that region, the total shipment for last week being only 96,194 tons, against 153,881 tons, during the same time last year. Taking into account the excessive production of a year ago, we may look upon this as about 30,000 tons under what may be considered the normal yield of the district. The number of suspensions is said to be fifty or sixty, some half dozen of which are among the best collieries in the region, and though their full effect is not as yet capable of exact estimate, it is thought the reduction of yield will amount to about one-third the usual weekly shipment. This, however, is not sufficient to act upon prices, at least at present. The amount of coal coming forward is still fully up to our necessities, if not beyond them, and it will take time for so small a reduction to have any effect, even upon prices so very depressed as those that now prevail. The *Miners Journal* of Pottsville points out that the production of Schuylkill County, for the 18 weeks from July 27, to December 5, 1871, was 2,539,000 tons. This is an average of 135,000 tons a week. The shipment from all quarters was, for the same weeks 9,050,721. The same paper says:

"Last year the shipments in the last week in July were heavy owing to an advance in tolls which was to take place. This year they are not so heavy owing to no advance having been anticipated on the present rates. The reduction in tolls now, it is believed will not increase the shipments any, but the impression now is that they will fall off because there is but little place to store the coal until the retail trade commences, which is not likely to commence before September, to any extent. We learn that a number of dealers urged the reduction, but we think it will not benefit the trade now, but rather have a tendency to check it to some extent, so far as Schuylkill is concerned. The shipments hereafter will show whether we are correct or not."

The Schuylkill men, however, seem to have concluded that it was useless to keep on mining in the face of a market so obstinately low.

Business is unaltered. Prices this month will probably rule about as last. The Delaware and Hudson Canal Company quote the same prices that were made last month; namely, $3 50 for Furnace, Steamer and Grate, $3 70 for Egg, $4 00 for Stove, and $3 60 for Chestnut. Trade appears very quiet, even to minds accustomed to the feeble activity of the past few months. When prices are to advance no one knows, and the movement may be delayed longer than is anticipated. At present there seems to be an expectation of improvement within a few weeks, but it is evident that the dull business of the Summer is pretty severely felt. Stocks are heavy and there is a wonderful lack of desire among consumers to take advantage of the low prices to lay in long stocks. When a rise does come we shall probably see some heavy business done and done in a hurry.

Freights of course cannot keep up under such circumstances. The Eastward rates are $1 75 to $1 80.

The Bituminous trade is happily able to report better things than its rival. Prices remain as they have been for weeks, but the demand is active, and some dealers report themselves as full of orders.

Anthracite Coal Trade for 1871 and 1872.

The following table exhibits the quantity of Anthracite Coal passing over the following routes of transportation for the week ending August 3, 1872, compared with the week ending August 5, 1871.

COMPANIES.	1871. WEEK.	1871. TOTAL.	1872. WEEK.	1872. TOTAL.
*Phila & Reading R. R†	160,087	2,851,722	121,665	3,264,209
Schuylkill Canal	40,193	469,314	43,897	464,262
*Lehigh Valley R. R.	75,252	1,036,571	66,666	2,039,045
Lehigh & Sus. R. R.	35,617	623,663	39,305	1,004,213
Lehigh Canal	26,949	247 168	26,606	387,992
Scranton North	18,983	187,807	18,953	407.427
" South	39,516	451,323	38,716	1,265,831
Penn. Coal Co., rail	29,120	276,372	24,201	693,473
" " " canal	240	5,548	249	2,998
Del. & Hud. Canal Co.	34,829	393,798	54,424	737,196
" East	9,626	150,995	4,214	363,880
" West	4,139	44,388	6,686	221,800
" South	10,409	136,697	8,054	215,320
Shamokin	12,141	374,475	13,702	314,027
Trevorton	....	.....	....	....
Lykens Valley Coal Co.	2,051	52,162	..	2,085
Wyoming North	....	.....	....	....
Wyoming South	....	.....	....	....
P. N. Y. C. & R. R. Co.	....	104,987	15,120	383,722
Williamstown Col'y	....	.....	....	....
Big Lick Col	3,753	79,452	....	10,591
Total	503,935	7,502,442	481,398	11,761,770
1870	461,398			7,501,442
Decrease	142,537			
Increase				4,259,328

* These figures are for the week and fiscal period commencing Nov. 30.
† Less coal transported for Co's use and Bituminous coal.

Bituminous Coal Trade, 1871 and 1872.

The following table exhibits the quantity of Bituminous Coal passing over the following routes of Transportation for the week ending August 3, 1872, compared with week ending Aug. 5, 1871.

COMPANIES.	1871. Week.	1871. Year.	1872. Week.	1872. Year.
C. & O. Canal	13,386	382,410	15,912	351,574
B. & O. R. R.	24,259	729,047	27,065	732,163
H. & B. T. R. R.	3,661	210,947	5,352	174,496
*Harrisburg & D.	5,814	348 543	5,604	306,335
*L. V. R. R.	8,061	238,354	546	18,739
P. & N.Y.C. & R. Co.	....	.....	6,976	228 113
Cumberl'd Branch Canal	4,274	109,368	5,818	117,478
" Railroad	1,270	44,695	316	10,840
Total	60,726	2,063,364	67.589	1,939,738
	....	1,939,738	60,726	
Decrease	....	123,626		
Increase			6,863	

Philadelphia & Reading Railroad and Branches.

COAL TONNAGE

For the Week ending Saturday, Aug. 3, 1872.

BY RAILROAD.—ANTHRACITE.

PASSING OVER MAIN LINE AND LEB. VAL. BRANCH.

	Tons.	Cwt.
From St. Clair	29,321	07
" Port Carbon	5,304	10
" Pottsville	2,658	16
" Schuylkill Haven	22,971	13
" Pine Grove	5,719	16
" Tamaqua	15,674	90
" Harrisburg		
" Dauphin	7,585	12
Total	89,275	04

FOR SHIPMENT BY CANAL.

Passing Frackville Scales	8,423	01
" Mill Creek "	2,969	17
" Schuylkill Valley Scales	1,153	19
" Mt. Carbon "	1,717	10
" Cressona "	7,130	09
" Pine Grove "		
" Tamaqua "	1,271	08
Total	22,665	19

SHIPPED WESTWARD VIA NORTHERN CENTRAL RAILROAD.

Passing Locust Gap	1,300	00
" Shamokin	2,596	11
" Herndon	.....	
Total	3,896	11

SHIPPED WEST OR SOUTH FROM PINE GROVE.

Via Schuylkill & Susquehanna R. R.	1,027	07
" Lebanon & Pine Grove Branch	985	05
Total	2,012	09

CONSUMED ON LATERALS.

From Frackville Scales	533	04
" Mill Creek "	439	04
" Schuylkill Valley Scales	609	17
" Mt. Carbon "	865	08
" Cressona "	204	12
" Pine Grove "	129	19
" Tamaqua "	207	03
Total	2,971	07

LEHIGH AND WYOMING COAL.

Received via Allentown, E. Penn'a Br.	32	19
" " Alburtis, " "	442	09
" " Oreland, G. & N. Br.		
" " Connecting R. R.	307	19
" " Willow Street R. R.		
Total	783	07

BITUMINOUS.

From Harrisburg	5,594	00
" Connecting R. R., G. & N. Br.		
" Junction R. R.	10	00
Total	5,604	00

COAL FOR COMPANY'S USE.

Anthracite	5,250	04
Bituminous	186	11
Total	5,436	15

RECAPITULATION.

	Total for Week.	Corresp'g week last year.	Increase and Decrease.
Passing over Main Line and Leh. Val. Branch	89,275 04	113,076 19	d 23,801 15
For Shipment by Canal	21,665 19	33,974 01	d 11,308 02
Shipped Westward via Northern Central R. R.	3,896 11	5,211 16	d 1,315 05
Shipped West or South from Pine Grove	2,012 09	3 177 14	d 1,165 05
Consumed on Laterals	2,971 07	3,512 18	d 541 11
Lehigh and Wyoming Coal	783 07	1,133 15	d 350 08
Total Anthracite paying freig't	121,604 17	160 087 03	d 28,482 06
Bituminous	5,604 00	5,813 19	d 209 19
Total of all kinds paying freig't	127,208 17	165,901 02	d 38,692 05
Coal for Company's use	5,436 15	4,966 16	i 469 19
Total Tonnage for Week	132,645 12	170867 18	d 38,222 06
Previously this year	3620775 14	3172037 02	i 448,738 10
Total to date	3753421 04	3342905 00	i 410,516 04

SHIPPED BY CANAL.

From Schuylkill Haven	22,590 00	32,615 00	d 10,025 00
" Port Clinton	1,307 00	2,855 00	d 1,561 00
Total Tonnage per Week	23,897 00	35,473 00	d 11,576 00
Previously this year	440,365 05	465,779 03	d 25,413 18
Total to date	464,262 05	501,252 03	d 36,989 18

Schuylkill Canal.

Report of coal transported over the Schuylkill Canal for the week ending Saturday, August 3, 1872.

	Tons.	Cwt.
From Schuylkill Haven	22,590	00
" Port Clinton	1,307	00
Total for week	23,897	00
Previously this year	440,365	05
Total	464,262	05
To same time last year	489,313	13

Lehigh Coal and Navigation Company,

Report of Coal transported over the Lehigh Canal and L. & S. Div of Central Railroad of New Jersey for the week ending Aug. 3, 1872, and for the year 1872.

	WEEK.	YEAR.
Forwarded East of M'ch Chunk by Rail	39,305 00	1,003,213 02
Delivered at and above do., ...	1,300 08	33,834 16
Forwarded East of do., by Canal	26,606 11	387,991 16
	67,211 19	1,425,039 14
Corresponding period last year—		
Forwarded East of M. Chunk by Rail	35,616 12	623,663 08
Delivered at and above do., ..	1,118 15	33,010 09
Forwarded East of do., by Canal	26,949 10	247,168 05
	63,684 17	903,842 02
Increase on Railroad	3,870 01	380,374 01
Decrease " "	.....	.....
Increase on Canal		140,823 11
Decrease " "	342 19	
Of the above there was transported on account of—		
Lehigh Coal Nav. Co	23,836 00	489,202 14
Wilkesbarre Coal & Iron Co	23,242 07	510,729 16
	47,078 07	1,069,784 07
Corresponding period last year—		
Lehigh Coal & Nav. Co	19,603 19	240,503 17
Wilkesbarre Coal & Iron Co	21,480 10	481,848 11
	41,084 09	722,352 08
Increase		347,431 19
Decrease	5,993 18	

Penn. and N. Y. R. R.—Coxton, Pa.

Coal tonnage for week ending August 3, 1872.

	Week. Tons.	Cwt.	Total. Tons.	Cwt.
Anthracite received:				
From Lehigh Valley R. R.	8,937	17	233,537	02
" Lack. & B. R. R.	1,807	09	52,674	11
" Pleasant Valley R. R.	3,563	13	63,540	02
" Sul. & Erie R. R.	811	11	33,970	02
Total	15,120	10	383,721	17
Distributed:				
To Lehigh Valley R. R.	1,285	14	23,336	10
To Lack. & B. R. R.			1,017	17
To S. Central R. R.	3,484	08	71,341	04
To Ithaca & A. R. R.	1,295	04	66,251	01
To Erie R. W. Pockets for shipm't.	7,967	15	162,956	12
To individuals on line of road	125	13	13,553	12
To points at & above Coxton for use of Co.	565	16	15,874	08
To points between Waverley and Elmira	396	00	23,390	13
Total	15,120	10	383,721	17
Bituminous received from BARCLAY R. R.				
Shipped north from Towanda	6,912	07	226,612	07
Shipped south from Towanda	64	01	1,364	01
Northern Central R. R.			137	01
Total	6,976	08	228,113	09
Distributed:				
To Erie Railway	6,536	16	203,520	00
To So. Central R. R.	363	11	22,928	12
To Ithaca Valley R. R.	12	00	33	15
Lehigh Valley, R. R.	42	12	1,004	18
To individuals on line of Railroad.	21	09	423	09
To points on line of road for use of Company	....		202	15
Total	6,976	08	228,113	09
Grand totals transported:				
Anthracite	15,120	10	383,721	17
Bituminous	6,976	08	228,113	09
Total	22,096	18	611,835	06

Delaware and Hudson Canal Company.

The following is a statement of Coal Transported by the Delaware and Hudson Canal Co. for the week ending August 3, 1872.

	FOR THE WEEK.	FOR THE SEASON.
By Delaware and Hudson Canal,	54.424	732,196
By Railroad, East	4,214	363,880
" " West	6,686	221.800
" " South	8,054	215,320
Total Tons	73,383	1,533,196

For the same period last year.

	FOR THE WEEK.	FOR THE SEASON.
By Delaware and Hudson Canal,	34,859	390,796
By Railroad, East	9,626	150,995
" " West	4,139	44,388
" " South	10,409	136,697
Total Tons	59,033	722,878
Increase	810,318	

Delaware and Hudson Canal Company.

Coal mined and forwarded by the Delaware and Hudson Canal Company for the week ending Saturday, August 3, 1872.

	WEEK.	SEASON.
North	50,285 07	1,508,334 18
South	8,054 06	215,320 00
Total 1872	58,339 13	1,723,654 18
Corresponding time in 1871:		
North	52,815 12	554,643 19
South	10,408 05	136,696 04
Total	63,223 17	691,340 03
Increase North		
Decrease North		
Increase South		
Decrease South		
Total decrease 1872	4,884 04	
Total increase 1872		1,032,314 15

Pennsylvania Coal Company.

Shipments of Pittston Coal for the week ending August 3, 1872.

	1872. WEEK.	1872. YEAR.	1871. WEEK.	1871. YEAR.
By Railway	23,201 05	683,473 10	29,120 09	276,371 16
" Canal	248 17	2,998 06	240 07	5,647 12
Total	23,450 02	686,471	29,360 16	281,919 10
Increase 1872	404,552 06			

Lehigh Canal Coal Trade.

Shipped for the week ending August 2, 1872.

		Week. Tons. Cwt.	Week. Tons. Cwt.
Total from Mauch Chunk	Region	7,957 19	130,291 13
" " Beaver Meadow	"	5,710 09	82,741 10
" " Mahanoy	"	474 18	6,134 05
" " Hazleton	"	7,997 13	122,534 17
" " Upper Lehigh	"	1756 18	15,674 16
" " Wyoming	"	3,078 14	30,614 15
Total		26,606 11	387,991 16
Corresponding week last year		26,949 10	247,168 05
Increase			140,823 11
Decrease		342 19	

Report of Coal Transported over Lehigh Valley Railroad

Report of coal tonnage for the week ending August 3, 1872, with totals to date, compared with same time last year.

WHERE SHIPPED FROM.	WEEK. Tons. Cwt.	TOTAL Tons. Cwt.
Total Wyoming	12,313 10	350,833 15
" Hazleton	47,699 18	1,445,411 00
" Upper Lehigh	39 09	1,599 07
" Beaver Meadow	18,863 04	495,798 01
" Mahanoy	12,081 09	255,007 16
" Mauch Chunk	52 06	2,190 01
Total	91,049 18	2,550,840 00
Same time last year	97,070 02	1,248,453 08
Increase		1,302,386 12
Decrease	6,020 04	
Forwarded East from Mauch Chunk by rail	69,665 12	2,039,044 17
Same time last year	75,252 04	1,035,571 04
Increase		
Decrease	8,586 12	1,003,473 13

DISTRIBUTED AS FOLLOWS.

Forwarded East from Mauch Chunk by rail	65,894 02	2,006,996 02
do East for use L. V. R. R.	771 10	32,048 15
Delivered at and above Mauch Chunk for use of L. V. R. R.	1,296 09	39,074 18
To P. & N. Y. R. R.	8,937 17	233,837 02
To N. C. R. R. at Mount Carmel		1,687 02
To D. H. & W. R. R.	543 06	17,016 03
To L. & S. R. R. at Packerton for rail	266 02	8,652 02
Delivered at M'h Chunk	5 10	1,169 16
Delivered on line of road above Mauch Chunk	50 08	11,132 09
To L. S. & R. R., at Penn Hav., for railroad		3,950 07
Do. for canal	7,997 13	123,001 04
To Lehigh Canal Mauch Chunk	4,772 13	65,799 08
To Catawissa Railroad	514 08	6,794 12
Total	91,049 18	2,550,840 00

Report of Coal Transported over Central R.R. of N. J. (Lehigh and Susq. Div.)

Week ending August 3—Compared with same time last year.

WHERE SHIPPED FROM	WEEK 1872., tons ct	WEEK 1871. tons ct.	YEAR 1872 tons cwt.	YEAR 1871. tons. cwt.
Wyoming Region	36320 04	35394 04	837256 05	656334 05
Upper Lehigh Region	4511 07	4666 13	115842 19	27276 15
Beaver Meadow Region				
Hazleton Region	8106 02	8299 00	128945 17	50012 02
Mahanoy Region				
Tresckow Region	4696 02	2565 06	82609 06	17640 02
Mauch Chunk Region	9744 14	7101 13	255501 10	95554 17
Totals	63368 09	57426 12	1420135 17	846818 01
Increase			573317 16	
Decrease	5941 13			
DISTRIBUTION.				
Forwarded East of Mch Chunk by Rail	39305 00	35613 12	1003213 02	623663 08
Forwarded East of Mch Chunk by Canal	16076 11	16426 05	246269 17	133487 17
Delivered at and above Mauch Chunk	1300 08	1118 15	33834 16	33010 09
L. V. R. R. at Packer'n	138 01	370 05	8485 14	20858 06
Delivered to L. & B. R. R. at Plymouth Bridge	5648 09	3994 19	128332 08	35798 01
Totals				
Of the above there was transported on acc'nt of L. C. & N. Co.	15878 01	10625 00	358911 01	130631 18
W.-B. C. & L. Co.	23242 07	21480 10	580581 13	481848 11
Totals	39120 08	32105 10	939492 14	612480 09
Increase	7014 18		327012 05	
Decrease				

Statement of Coal Transported over Cumberland and Pennsylvania Railroad

During the week ending Saturday August 3, and during the year 1872, compared with the corresponding period of 1871.

WEEK.

	To C. & O. Canal Tons. Cwt.	To B. & O. R.R. Co. Tons. Cwt	Total. Tons Cwt.
1872	15,912 04	27,065 10	42,977 14
1871	13,385 13	24,259 02	37,644 15
Increase	2,526 11	2,806 08	5,332 19
Decrease			

YEAR.

1872	351,573 18	732,163 12	1,083,737 10
1871	382,410 17	729,047 12	1,111,458 09
Increase		3,116 00	
Decrease	30,836 19		27,720 19

Cumberland Branch R. R.

WEEK.

	To C. & O. Canal. Tons. Cwt.	To B. & O. R.R. Co Tons Cwt.	Total. Tons. Cwt.
1872	5,818 06	316 01	6,134 07
1871	4,273 12	1,269 14	5,543 06
Increase	1,544 14		591 01
Decrease		953 13	

YEAR.

1872	117,477 18	10,839 19	128,317 17
1871	109,367 15	44,695 05	154,063 00
Increase	8,110 03		
Decrease		33,855 06	25,745 03

Delaware Lackawanna & Western Rail Road Company.

Coal transported on the Delaware, Lackawanna, & Western Railroad for the week ending Saturday, August 3, 1872.

	WEEK. Tons. Cwt.	YEAR. Tons. Cwt.
Shipped North	18,952 11	407,427 10
Shipped South	38,716 07	1,265,531 05
Total	57,668 18	1,672,958 15
For the Corresponding time last Year:		
Shipped North	18,983 02	187,807 09
Shipped South	39,516 03	451,323 05
Total	58,499 05	639,130 14
Increase		1,033,828 01
Decrease	830 07	

Shamokin Coal Trade.

For week ending August 3, 1872	13,701 12
Same time last year	13,141 03
Increase	560 09
Decrease	
Total amount shipped to date	314,026 14
Same time last year	374,475 09
Increase	
Decrease	60,448 15

Prices of Coal by the Cargo.

[CORRECTED WEEKLY.]

	AT NEW YORK. August 9. R. A.	W. A.	AT PHILADELPHIA. August 9. R. A.	W. A.
SCHUYLKILL.				
Lump	$— —	$— —	— —	— —
Steamer	— —	— —	— —	— —
Broken	— —	— —	— —	— —
Egg	5 25	4 75	— —	— —
Stove	5 50	5 00	— —	— —
Chestnut	4 25	— —	— —	— —
Pea	— —	— —	— —	— —
LEHIGH.				
Lump, (along side)	5 35	— —	— —	— —
Broken	4 60	— —	— —	— —
Egg	4 60	— —	— —	— —
Stove	4 85	— —	— —	— —
Chestnut	4 35	— —	— —	— —
Pea	— —	— —	— —	— —
SPECIAL COALS *				
Honey Brook, Le'h W. A.	4 00@5 00		— —	— —
Spring Mountain " "	— —@— —		— —	— —
Sugar Creek " "	— —@— —		— —	— —
Sugar Loaf " "	— —@— —		— —	— —
Old Comp'y's " "	4 00@5 15		— —	— —
Room Run " "	4 00@4 50		— —	— —
McNeal " "	— —		— —	— —
Girardville " "	— —		— —	— —
Hill & Harris " "	— —		3 10@4 00	— —
Shamokin " "	— —		— —	— —
Lykens Valley " "	— —		— —	— —
Broad Top " "	— —		— —	— —
McMichael " "	— —		3 25@4 25	— —
Henry Clay " "	— —		— —	— —
Powelton " "	— —		— —	— —

Company Coals.

August, 1872.

	L.	Str.	Gra.	Eg.	Sto	Chest
*Scranton at E. Port	3 60	3 85	3 75	3 85	4 25	3 80
*Pittston at Newburg	3 50	3 50	3 50	3 50	3 70	3 50
*Lackawana at Weehawken	3 50	3 50	3 50	3 70	4 00	3 60
Wilk'b're at Hoboken	3 75	3 75	3 85	3 85	4 25	3 80
Old Co. Lehigh at Pt John'n	5 25	—	4 50	4 50	4 60	4 60
Lehigh at Iliz. Port	5 00	—	4 25	4 25	4 50	4 00

For freights to different points see "Freights."
To contractors only.

Prices at Baltimore—August, 1872.

Wholesale Prices to Trade

Wilksbarre, by cargo or car load	$4 60@4 85
Pittston and Plymouth, do	4 60
Shamokin Red or White Ash, do	4 75
Lykens Valley Red Ash, do	5 50
Zerba Valley	
Treverton	
By retail, all kinds per ton of 2,240 lbs	6 50@7 50
George's Creek and Cumberland f. o. b. at Locust Point for cargoes	4 60@4 65
Fairmont and Clarksburg gas f. o. b. at L. Point	6 00
BITUMINOUS COALS.	
Kittaning Coal Co.'s Phœnix Vein, f. o. b. at Phila	$
Lemon " " "	
Cumberland Vein Coal	
Consolidation Coal Co.'s on board N. Y.	
Maryland Coal Co " "	

Prices at Georgetown, D.C., and Alexandria, Va.

August, 1872.

George's Creek and Cumberland f. o. b. for shipping $ 4 75

Prices at Havre de Grace, Md.

August, 1872.

Wilkesbarre and other White Ash for Cargoes	$4 25@4 50
Lykens Valley	@5 50
Shamokin Red or White Ash	4 25@4 50

Bituminous Coals (Cumberland),

Georgetown, F. o. b.	$4.25
Baltimore	4.50
New York	6.60

Prices of Gas Coals.

August, 1872.

PROVINCIAL.

Corrected weekly by Louis J. Belloni, Jr., 41-43 Pine st., N. Y

	Coarse	Slack.
Block House	$1 60	$— 75
Gowrie	1 60	— 75

Vessels are being chartered at $3 00 to $3 25.

Corrected by Bird, Perkins & Job, 27 South street.

	Coarse.	Culm of Coal,
Pictou	$2 25	1 25
Sydney	2 25	- 80
Lingan	1 60	- 80
Caledonia	1 60	- 80

A discount from the prices of the coarse Coal on purchase of 5000 tons and upwards. Duty on all slack coal or Culm: 40c. per ton of 28 bushels, 80 pounds to the bushel. On all bituminous coal or shale: 75 cents per ton of 28 bushels.

AMERICAN.

	Currency.
Westmoreland	$7 10 @— —
Fairmount Gas Coal Co. of N. Y.	7 00 @— —
Despard Coal Co	7 00 @— —
Penn	7 10 @— —
Newburg Orrel Gas	— — @— —
West Fairmount Gas Coal	7 00 @— —
AT PHILADELPHIA.	
Westmoreland	6 00 @— —

Prices of Foreign Coals.

August, 1872.

Duty 75 c. per ton.

Corrected weekly by ALFRED PARMELE, No. 32 Pine street, N. Y.

Liverpool Gas Caking	$ 8 00@— —
" " Cannel	12 00@13 00
" House "	19 00@20 00
" Orrel	14 00@16 00

Per ton 2,240 lbs., ex-ship.

PRICES FROM YARD.

Liverpool House Orrel, screened	$14 00@16 00
"Cannel, "	19 00@23 00

Per ton 2,000 lbs. delivered.

Freights.—August 8, 1872.

TO EASTERN PORTS.	Cumberland. From Georgetown.	Cumberland. From Baltimore	Anthracite. From Philadelphia	Anthracite. From Elizabethport, Port Johnston, and Hoboken.	Anthracite. From Newburgh.	Anthracite. From Rondout...
Amesbury				1 85		
Bangor						
Bath	3 00	2 90		2 00		
Boston	2 80	2 75		1 70	1 90	
Bridgeport	2 33	2 30		1 00	1 15	
Bristol	2 40			1 40	1 40	
Cohasset Narrows	2 75					
Derby	2 75			1 25		
Dighton	2 50					
East Cambridge				1 70	1 90	
Fall River	2 40	2 35		1 40	1 60	
Hackensack						
Hartford	2 85	2 90		1 60	1 75	
Hoboken	2 00			50		
Jersey City	2 00			50		
Middletown				1 30	1 50	
Mystic						
New Bedford	2 60	2 75		1 45	1 65	
Newburyport	2 90	3 00		1 90	2 10	
New Haven	2 40	2 30		1 00	1 15	
New London	2 40	2 35		1 25	1 35	
Newport	2 40			1 40	1 60	
New York	2 15	1 90		50	60	
Norwalk	2 40	2 50		1 00	1 15	
Norwich	2 50	2 40		1 25	1 45	
Pawtucket	2 60	2 90		1 50	1 70	
Portland	2 85	2 75		1 70	1 90	
Portsmouth, N. H	2 90	2 90		1 85	2 05	
Providence	2 40	2 35		1 40	1 60	
Rockport						
Saco				1 85		
Sag Harbor				1 30		
Salem	2 85	3 00		1 75	1 95	
Stamford				1 00	1 15	
Stonington				1 35		
Taunton				1 90		
Warren				1 40	1 60	
Washington						
TO RIVER PORTS						
Albany	3 00	2 50				
Catskill						
Cockaackie						
Coeyman's						
Cold Spring	2 30	2 25				
Fishkill						
Haverstraw	2					
Hudson	2 30	2 30				
New York						
Nyack	2 25					
Poughkeepsie	2 20					
Rhinebeck						
Rondout						
Saugerties						
Sing Sing						
Stuyvesant						
Tarrytown						
Troy	3 00	2 50				
West Point						
Yonkers						

Foreign and Provincial Freights.

August 1872.

Foreign.

Newcastle and Ports on Tyne, per keel of 21 1-3 tons £
Liverpool, 5 per cent primage

TO NEW YORK.

Provincial.	
Sydney	$3 05
Lingan	3 15
Cow Bay	3 52
Port Caledonia	3 10
Little Glace Bay	3 00

TO BOSTON.

Sydney	3 00
Lingan	3 00
Cow Bay	3 00
Port Caledonia	3 00
Little Glace Bay	2 90

Rates of Transportation to Tide Water.

BY RAILROAD.

TO PORT RICHMOND, PHILADELPHIA.

Philadelphia and Reading Railroad, from Schuylkill Haven for consumption ($1 85 less 55c drawback	$1 30
For reshipment	1 75

MAUCH CHUNK TO ELIZABETHPORT.

L. V. Railroad from Mauch Chunk to Phillipsburgh	$0 66
C. R. R., N. J., Phillipsburgh to Elizabethport	0 98
Shipping expenses at Elizabethport	25
Wharfage	10
Total	$1 99

MAUCH CHUNK TO PORT JOHNSON.

L. V. R.R., or L. & S. R.R. from M. C. to Phillipsb'g	$0 66
C. R. R., of N. J., Phillipsburgh to Pt. Johnson	0 98
Shipping expenses	25
Wharfage	10
Total	$1 99

TO HOBOKEN

L. V. R. R., Mauch Chunk to Phillipsburgh	66
Morris & Essex R. R. Phillipsburgh to Hoboken	0 98
Shipping expenses	25
Wharfage	10
Total	$1 90

TO SOUTH AMBOY.

L. V. R. R.	66
B. & D. R. R.	95
Cam. & Am. R. R.	
Shipping Expenses,	3
Total	$ 199

PENN HAVEN TO ELIZABETHPORT.

L. V. R R. Penn Haven to Phillipsburgh	0 7
C. RR. of N. J. Phillipsburgh to Elizabethport	0 98
Shipping expenses	2
Wharfage	10
Total	$2 11

MARKET REVIEW.

NEW YORK, August 8, 1872.

IRON.—The market for Scotch Pig is without any new feature, being very quiet, though full prices are still asked, the demand from manufacturers continues light; the sales are 200 tons Eglinton to arrive, at $52; 100 do. Langloan, $53; 100 do. Glengarnock, $55; and several small lots mixed brands, together about 500 tons on a basis of $52 for Eglinton: we quote Eglinton, $52, Gartsherrie $55a56, Glengarnock $54a55, and Coltness $57,50, American is as scarce as ever, and No. 1 Lehigh brands are about out of market with no large quantity to be had of any kind for present delivery, at any price. We hear of only 50 tons Allentown No. 1 at $55 at Hoboken; we quote No. 1 $53a55, No. 2 $49a52, and Gray Forge $48. Rails have been in fair request, and New English are firm at $72a74, gold, though some importers are asking higher prices. We note a sale of 2000 tons at a price not transpired, Old Rails are quiet at $53a54 gold, with sales of 250 tons on private terms. Scrap is dull and depressed at $54a55 from yard and $48a50 from dock, with a sale of 75 tons at $49 cash, ex-ship. Refined Bar from store continues very firm at our quotations, with indications of a further improvement, in the near future. We note a sale of 200 packs Russian Sheet on private terms—our quotations is about the market value for merchantable.

PHILADELPHIA, August 5,—(From Circular of Edward Samuel.)—In Pig there is more firmness and a tendency to advance. Grey Irons which, a fortnight ago, could have been purchased in the Susquehanna District at $44 per ton at furnace, are now held at $46. Good Lehigh Foundry grades are extremely scarce. Best Refined Bars advance to 5 cents, Base Mill price, and the mills generally 60 to 90 days orders ahead. Closing prices of the week: No. 1 Foundry Pig at furnace $52a53, No. 2 $49a51, No. 3 Forge $47a48, and No. 4 White and Mottled $42a44.

COPPER.—New Sheathing is steady at 43 cents, and Braziers and Bolts 45. Bronze and Yellow Metal Sheathing 30, and Y. M. Bolts 32. In Ingot there has been a large business, partly on speculation, but the bulk of the purchases have been made by manufacturers; prices are firm and harden. The sales are 250,000 lb. Lake at 38¼a38½ cents; 150,000 lb. Tennessee, 33¾; 900,000 lb Lake, for September to December delivery 34; and 50,000 lb. Best Selected English, 33. In addition to the above there is a rumor, which we believe to be well founded, of the sale of two millions pounds Lake, for delivery from October to March next at 35 cents. 2000 lb. Old Copper sold at 28 cents.

LEAD.—Since the considerable business in Pig noted in our last, the market has been quiet. Holders are firm at $6,4½a6,50 gold for ordinary Foreign. Bar 9¼ cents, Sheet and Pipe 11, Tin-lined Pipe 15 and Block Tin Pipe 65, all less 10 per cent to the Trade.

SPELTER—The foreign advises encourage holders, and prices are firm and tend in sellers' favor. 50 tons Silesian changed hands at 7 cents gold.

STEEL—The markets continue steady and firm at our quotations.

TIN—Pig remains very quiet, and prices are nominal at 35¼a35½ cents for Straits, 35¼a35½ for English, and 46a48 for Banca, all gold. Per cable we learn that the sale at Batavia, 5th inst., went off at f.96.84 against f.96.04 sale of June 3, and f.99.40 sale of April 5. The June sale last year was at f.80.10. Plates are very scarce and firm, with higher prices generally demanded. Assorted Charcoal Tin are now held at $18,62½, and ¼d X $13,75; sales have been made of 750 bxs. assorted Charcoal Tin at $13,50; 500 do. Coke Tin, 14 by 20, $13,50 gold; and 400 do., 10 by 14 and 14 by 20; 500 do. Charcoal Terne, and 5000 do. Coke Terne, on terms not made public.

The following is from Messrs. White & Haskell's Metal Circular of 31st ult.;—

The importations of Pig for July, were:—

	Slabs.	Tons.
Straits, &c	13,550	550
English, L & F		5
Banca	none	none

From the East Indies, 15,298 slabs or 615 tons Straits are on the way and due in all August September and October.

Stock in importers and Speculators hands:—

	Slabs.	Tons.
Straits, &c	5,000	200
English, L & F		28
Banca		none
Total, New York and Boston	5,000	228
Against July 31, 1871	1,358	75
" " 1870	2,130	80
" " 1869	14,000	562

ZINC—Sheet is steady and firm at our quotations. Metallic 10¼a11, American dry 8a8½, French 9a10, Manganese 4a5.

METALS.

NEW YORK, August 8, 1872.

IRON.—Duty: Bars, 1 to 1¼ cents ℔ lb; Railroad, 70 cents ℔100 lbs.; Boiler and Plate, 1¼ cents ℔ lb; Sheet, Band, Hoop, and Scroll, 1¼ to 1¾ cents ℔ lb; Pig, $7 ℔ ton; Polished Sheet, 3 cts. ℔ lb; Galvanized 2½; Scrap Cast, $6; Scrap Wrought, $8 per ton.

	Store Prices.
Pig, Scotch No. 1, ℔ ton	52 00@57 50
Pig, American, No. 1	53 00@55 00
Pig, American, No. 2	49 00@52 00
Pig, American, Forge	48 00@— —
Bar Refined, English and American	115 00@120 00
Bar Swedes, assorted sizes ' gold	120 00@130 00
	Store Prices, Cash.
Bar, Swedes	130 00@145 —
Bar, Refined, ¾ to 2 in. rd. & sq. 1 to 6 in. x ¾ to 1 in.	— —@115 00
Bar, Refined, 1¼ to 6 by ¼	120 00@— —
Bar, Refined, 2⅜ to 2¾ round 1 & 1¼ by ¼ & 5:16	122 50@— —
Large Rounds	122 50@132 50
Scroll	135 00@165 00
Ovals and half-round	135 00@155 00
Band	— —@130 00
Horse Shoe	125 00@135 00
Rods, ⅝ to 3-16 inch	120 00@160 00
Hoop	140 00@187 50
Nail rod	8¾@— —
Sheet, Russia, as to assortment (gold)	— 49 12
Sheet, Singles, D. and T. Common	—6½@— 7½
Sheet, D. and T. Charcoal	—7¾@— 8½
Sheet, Galv'd, list 10 per cent discount	—@— —
Rails, English (gold), ℔ ton	73 00@ 74 00
Rails, American, at Works in Pennsylvania, currency	85 00@— —

COPPER.—Duty: Pig, Bar, and Ingot, 5; old Copper 4 cents ℔ lb; Manufactured, 45 per cent. ad val.

	All Cash.
Copper, New Sheathing, ℔ lb	— @— 43
Copper Bolts	— @— 45
Copper Braziers, 16oz. and over	— @— 45
Copper Nails	— @— 45
Copper, Old Sheathing, &c. mixed lots	26 @— 28
Copper, Old, for chemical purposes, 16@16 oz.	— @— —
Copper English Pig	— @— 33
Copper, American Ingot	— @— 33½
Yellow Metal, New sheathing & Bronze	— @— 30
Yellow Metal Bolts	— @— 32
Yellow Metal Nails	30 @— 32

LEAD.—Duty: Pig, $2 ℔ 100 lbs.; old Lead, 1¼ cents ℔ lb; Pipe and Sheet, 2¾ cents ℔ lb.

Galena, ℔ 100 lbs	$— —	@— —
Spanish (gold)	6 40	@6 50
German, do.	6 40	@6 50
English do.	6 50	@7 12½
Bar (net)	9 25	@— —
Pipe (net)	— —	@11 00
Sheet	— —	@11 00

Colwell, Shaw & Willard Tin-Lined Lead Pipe 15 cts. ℔ lb.

STEEL.—Duty: Bars and ingots, valued at 7 cents ℔ lb or under, 2¼ cents; over 7 cents and not above 11, 3 cents ℔ lb; over 11 cents, 3½ cents ℔ lb, and 10 ℔ cent ad val. (Store prices.

English Cast (2d and 1st quality) ℔ lb	—	16½@— 19½
English Spring (2d and 1st quality)	—	9½@— 10½
English Blister (2d and 1st quality)	—	11½@— 16
English Machinery	—	11½@— 13½
English German (2d and 1st quality)	—	11¾@— 12
American Blister "Black Diamond"	—	—@— 12
American, Cast, Tool do.	—	15 @— 16
American, Spring, do.	—	9 @— 11
American Machinery do.	—	10 @— 10½
American German, do.	—	9 @— 11

TIN.—Duty: Pig, Bars, and Blocks, 15 ℔ cent. ad val.; Plate and Sheets and Terne Plates, 25 ℔ cent.; Roofing 25. ad val.

	Gold ℔ lb.
Banca	46 @48
Straits	35½@—
English	35¼@35½

PLATES. *Fair to Good Brands.*	*Gold.*	*Currency.*
I. C. Charcoal, ℔ box	$13 50 @14 00	$15 75 @16 00
I.C. Coke	12 50 @12 75	14 75 @15 00
Coke Terne	10 75 @11 25	12 50 @13 50
Charcoal Terne	11 75 @12 25	14 00 @14 50

SPELTER—Duty: In Pigs, Bars & Plates, $1.50 p. 100 lb

Plates, Foreign (gold) p. 100 lb.	6 87½@	7 12½
Plates, Domestic p lb.	— 8 @—	11

ZINC—Duty: Pig or Block, $1.50 per 100 lb.; Sheet 2¼c. per ℔

Sheet per lb.	— 10 ½@	11

San Francisco Stock Market.

BY TELEGRAPH.

NEW YORK, August 8, 1872.

We have advices from the San Francisco Stock Board dated the 6th inst. Yellow Jacket and Chollar Potosi have slightly declined, the remaining portion of the list has advanced. A San Francisco contemporary in a recent review of the Pacific coast mining interests, states that valuable discoveries recently made, not only in the lower levels of the Comstock Lode, but throughout all parts of our gold and silver-bearing fields, are said to have begotten increased confidence in this branch of industry. The late advance in mining shares, we gather from this review, is based on the conviction that the business of mining, vitalized by abundant capital and added by the numerous economies now being introduced, must soon yield far better results than have yet been obtained, to say nothing of the still greater gains that may be expected to attend its maturer years.

We have also appended the report of the 1st inst., showing the course of the market during the two days.

	Aug. 1.	Aug. 6.
Savage	170	184
Crown Point	145	148
Yellow Jacket	145	139
Kentuck	—	290
Chollar Potosi	107	99
Gould & Curry	190	180
Belcher "New Issue"	120	120
Imperial	13½	14
Hale & Norcross	—	—
Eureka G. V.	—	—
Ophir	—	—
Alpha	—	—
Raymond & Ely	—	—
Amador		

A wealthy gentleman of the Lake Superior region who is a wee bit eccentric, has given orders to be buried in a copper coffin, inlaid with amygdaloid and conglomerate rock.

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DEPARTMENT OF POPULAR SCIENCE.

Mining for Manures.

There is little danger that the world will suffer from the exhaustion of its guano islands. On the contrary, the production of mineral manures will be transferred, from a few solitary islands, to the main land, and instead of engaging a limited number of workmen it bids fair to become one of the great industries. With iron it can hardly rank in importance, but it can follow after that great staple, in the amount of material used and in the value of the product, considered in relation to the world's wealth. We have, from time to time, noted the discovery of phosphatic deposits, all over the world, and our readers are well informed concerning the great industry that is carried on in South Carolina. The guano islands have fulfilled their task. They have pointed us to the true source from which the soil is to be restrengthened, after the exhaustive demands we make upon it, and now that their own stores are dwindling we have only to turn our forces to the production of manures from other mineral deposits.

One of the most interesting of the recent developments in manures, is the use of a common limestone in Belgium for the production of a nitrogenous manure. This stone is found in numerous places, near Mons, near Jodoigne and near Maestricht. We call it a common limestone because its analysis exhibits nothing peculiar. Its composition is :

Carbonate of Lime	75.00
Carbonate of Magnesia	1.46
Phosphate of Lime	2.10
Oxide of Iron, Alumina, Silica	20.44
Sulphur and loss	1.00
	100.00

The substance attracted great attention at the Paris exposition, and M. LECLERC, reporter of the jury, says of it : "Nitrogen, which plays a role of considerable importance in the phenomena of vegetation, and which of all fertilizing materials, contained in artificial manures, is that which costs the farmer most, exists in inexhaustible quantity, in the atmosphere which encircles our globe. To obtain so precious an element from the air, in order to make it enter, by economical means, into stable combinations, is a problem which interests agriculture, as well as many other industries in the greatest degree.

"It is three or four years since a method was pointed out to the Brittania Company, near Ostend, which appears to accomplish this, for agricultural uses, in a manner most complete and satisfactory ; it rests upon the use of coral limestone."

This coral limestone of which we are speaking is very porous, and possesses in a high degree the power of condensing the nitrogen of the air, in presence of decomposing organic matters, and transforming it into nitric acid. The rock belongs to the Cretaceous formation, and has in Europe but three important outcrops, at the places we have mentioned, all of which are in Belgium.

The use of this rock is to take the place of plaster of Paris in compost heaps. It is powdered and mingled with manure, the heap being watered from time to time. Nitric acid is formed, which unites with the lime, and forms a notable quantity of nitrate of lime, as much as ten per cent, according to experiments made. Heaps that are covered from the rain make less nitrate than those in the open air, a fact that proves the necessity of circulation. This particular rock however is said to have proved much more useful than other manures, for this purpose.

Mr. DONNY professor of chemistry at the University of Ghent, says that for 100 of nitrates obtained by the employment of chalk, this limestone will furnish 170 ; and if one-half per cent of nitrate of soda is added to the pile, the production will be 192. The addition of a small quantity of nitrate of soda, therefore produces an increase of yield amounting to three times its own weight.

We have in this country, all along the line of our Eastern sea-coast, beds of marl which, though greatly neglected now, will one day be the source of great industry. In the Southern States some of these marls bear a high percentage of phosphorus, enough to rank them with good phosphatic manures. Subjected to a process like this they would yield a manure of double value. They offer, too, a means of utilizing what is probably destined to be a mine of national and private wealth in the future—the sewage of great cities. The value of the constituents of the Paris sewage is estimated at 9 francs a cubic metre, and though it may be years before we learn how to utilize such immense quantities of material, no one doubts that the day will come. Already Paris has an offer of more than six francs a cubic metre for all its sewage, the contract to extend over fifteen years. The work is of a new kind, as the remarkable discrepancy in the bids made at Paris shows. They were

	francs per cubic metre.
1. MM. Peligot and Co	0.70
2. Renard and Co	1.375
3. Berse	0.85
4. Lancauchez	1.67
5, Sillar, Bauson, Crooks, Symington, and Phillipe (for the Native Guano Company	3 50
6. Newcomen and Co	6.07

We may expect from this experiment—for it is really no more—results that will fix a value for sewage ; and it is to be hoped that cities and streams will no more be pestered with a substance that is valueless at present, only because we are ignorant of the means to make it valuable.

Agriculture now looks to mining to support its labors, and we are confident that it will not look in vain. All things point to the introduction of an industry, a combination of mining and chemical processes, which will increase the number of miners and give added importance to a guild already numerous and powerful.

Mining Machinery.

The *American Artizan* says that our manufacturers appear to be quietly pushing the progress of their enterprise into remote regions, and mechanism devised by American invention finds its application in many a far-off country. The Delamater Ironworks are building considerable mining machinery for South America, much of it being designed for use on the Orinoco River. This comprises stamp-mills, etc. Air-compressors, for running drilling and other apparatus below the surface, are now attracting much attention, the works referred to having built five of a German model, one of them for the Calumet & Hecla Copper Mining Company, of Lake Superior. These compressors are so constructed that, fore-and-aft of the horizontally moving piston, a sufficient body of water is maintained to fill all the passages leading from the cylinder, at the end of each stroke. By this means no air is left in the cylinder or its ports to expand again during the reverse movement of the piston. The water also serves to absorb the heat evolved by the compression of the air, and which without some means of removal would heat the machinery, and impair, if not destroy its efficient operation. This matter of air-compressing promises to be one of very great importance, for some of the best mines in this, as in other countries, are becoming so deep that the temperature is intolerable and the exhaust from an engine worked by compressed air, from the heat rendered latent by the expansion of the exhaust air, will materially remedy the difficulty.

The same paper speaks of some tall pumping at Triumph, Pa., where the water has to be lifted from the Alleghany River to the summit of Triumph Hill, a vertical height of six hundred and eighty-five feet, or more than twice as high as Trinity church steeple. The horizontal distance is two and three quarter miles. The pressure per square inch in the water cylinders of the steam pumps is seven hundred pounds. Three pumps are used, each lifting two hundred thousand gallons, every twenty-four hours. This water is designed for supplying the boilers of the steam engines used at the oil wells in the vicinity. The steam pumps have a piston stroke of eighteen inches ; the diameters of the steam and water cylinder are respectively twenty inches, and six and one half inches. The pressure above mentioned in the water cylinder is notable as closely approaching that ordinarily employed in the cylinders of hydraulic presses.

Graphite.

Dr. CARL BISCHOF, of Wiesbaden, has instituted a very exhaustive series of experiments to determine the value of graphite used in the manufacture of crucibles. From these he deduces the following conclusions :

1. A quantitative determination of the amount of carbon on the one hand, or of impurities on the other, does not fully decide the value of graphite for resisting the action of heat, supposing, of course, that no extraordinary difference in the constituents exists, although this difference may be quite considerable. Neither a greater nor less quantity of carbon, nor of admixture, even if the former varies as much as eight per cent., is decisive.

2. Far more depends on the quality of the accessory constituents, namely, on the proportion of the alumina to the flux (which, if reversed, as with fireclay, is so much the more worthy of attention), together with the eventual relation of alumina to silicic acid.

3. The nature of the carbon, its greater or less non-combustibility, also plays a part, but only a secondary one. If the total relations be the same, or very nearly alike, the quality of the carbon is to decide.

4. As a rule, an accurate chemical analysis furnishes only a starting point. If the analyses are equal, then the furnace experiment is to be taken as a practical criterion.

5. It is advisable to carry out both the analysis and the furnace experiments, even where both are not absolutely necessary, since they thus control each other. If the analytic and pyrometric results agree, it is a proof that they are correct ; if they disagree, it is almost certain proof of an error in the tests. It requires considerable skill to make a thorough test of the quality of graphite for the use of the crucible manufacturer, and none but an experienced chemist should undertake it.

Tyndall's Illustrations.

Professor TYNDALL is so neat an experimenter that it is worth while to watch the illustrations he selects for his lectures. Here is one, on expansion by heat : "Placing between the jaws (of Whitworth's microscopic gauge) a bar of bismuth, both ends of which are planes, screwing up the instrument till the test-plane is within 1-10,000th of an inch of falling, and grasping the bismuth for a moment by the hand, the bismuth is expanded, and both it and the test-plane are held fast."

It is well known that some boiler explosions may be explained by the fact that when water has been boiled long enough to lose its air, it does not become steam gradually as before, but the whole mass is suddenly converted into vapor. FARADAY, to obtain water without air, availed himself of the extraordinary power possessed by bodies, in crystallizing, of excluding air ; water in freezing, that is, in taking up its crystalline form, excludes everything extraneous to itself. Could he then get pure ice melted without contact with air, he would have water still more perfect than boiled water, and it ought to produce the same effect. The experiment was performed : a small lump of ice was placed in a clean test tube in an oil bath, and just covered with oil. The whole being surmounted by a glass jar to avoid scattering the oil. When the water boiled, it did so with a sharp explosion, violently discharging the oil above it into the air. A second tube containing common water covered with oil boiled tranquilly.

THE ENGINEERING AND MINING JOURNAL.

ROSSITER W. RAYMOND, Ph. D.,
JOHN A. CHURCH, E. M.
Editors.

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THE ENGINEERING AND MINING JOURNAL *is projected in the intent of furthering the best interests of the Engineering and Mining public, by giving wide circulation to original special contributions from the pens of the ablest men in the professions. The careful illustration of new machinery and engineering structures, together with a summary of mining news and market reports, will form a prominent feature of the publication.* It is the Organ of the American Institute of Mining Engineers, and is regularly received and read *by all the members and associates* of that large and powerful society, *the only one of the kind in this country.* It is therefore the best medium for advertising all kinds of machinery, tools and materials used by engineers or their employees.

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A Lake Superior paper announces that some prominent owners of iron ore mines propose to try the shipping of a few cargoes from Lake Superior direct to England, and that some pig metal makers are to join them with their product. American furnace men had better supply the demand of their own country first. As to the shipment of ore, we do not wonder that the English strut and brag of the world's dependence upon them, when we see Americans, with every inducement to become manufacturers, and every requisite in abundance in their country, for carrying on their own trade, forcing the English to do their work for them. The English are right. Their country is the workshop of the world, but it is not they who have made it so, but their rivals, who go hat in hand begging them to make themselves rich by doing the world's work.

There is nothing like the hopefulness of miners. A Lake Superior paper boldly announces that "when phosphor bronze gets a foothold in this country, it will consume several thousand tons of copper annually." No doubt. But it must first get its footing, and that, we fear, will be a slow proceeding. Phosphor bronze, we believe, is used for the manufacture of some small articles in Europe, but its employment for cannon is a proposal long since defunct.

The Prevention of Boiler Incrustations.

The railway men propose to take advantage of a hint offered some years ago by Dr. CHANDLER, for preventing the formation of incrustations in boilers, and consequently the large number of explosions which result from this cause. In a report upon the water used on the New York Central road, Dr. CHANDLER said: "Boiling expels the free carbonic acid, and causes the separation of the carbonates of lime and magnesia, and if conducted at a high temperature, under considerable pressure, results in the almost complete precipitation of the sulphate of lime. This would, however, merely transfer the incrustations from the locomotive boiler to some other vessel, and would therefore be valueless in this case."

The proposal now made is to boil the water in a vessel placed at each tank along the line of the road, precipitate the impurities, and then run the water into the tank. This certainly appears to offer the simplest and most reasonable method of dealing with incrustations. The apparatus suggested is described as follows: "Let each watering-station on the line of the road be provided with a pumping engine or steam pump, with a capacity in proportion to the amount of water required. The exhaust steam from the pumps should be conducted into a suitable heater, together with as much live steam as may be necessary to raise the water to a boiling heat. The heater being closed, the water within it at the boiling point would be subjected to a pressure of 15 lbs. to the square inch. The heater should be made of iron, and as large, perhaps, as one-third the capacity of the tub. While the heater is being filled, the water should be raised to the boiling point, after which the calcareous and other matter in suspension should be allowed time to settle, when the water can be drawn off into the tub arranged to receive it. After the heater is emptied, the sediment may be blown off, and this process repeated until the tub is filled, thus keeping up the supply of purified water according to the demand."

For this apparatus the expense would be about as follows: One pump (say a No. 4 Knowles) with boiler, $450; heater and fixtures not more than $1,000. Those watering-stations where steam force is already employed could be fitted with this apparatus for about $800. For running expenses there are required: to pump one thousand gallons of water, about sixty and a half pounds of coal; and to raise one thousand gallons of water to the boiling point, one hundred and seventy-one and three-quarters pounds of coal; total, two hundred and thirty-two pounds nearly. In reference to the quantity of coal put down for boiling the water, it is to be remarked that of the thousand gallons, fifty-five gallons will be heated by the exhaust steam from the pump, which leaves nine hundred and forty-five gallons to be heated by coal. At five and a half gallons to the pound of coal, this gives a hundred and seventy-two pounds of fuel, nearly.

One thousand gallons of water, then, require for its purification two hundred and thirty-two pounds of coal, or very nearly ten thousand gallons to one ton of fuel. To purify the water for one locomotive, during one year, will cost ninety-four and one-half tons of coal, which, at $2,50 a ton, amounts to $236, 25. Against this there is to be set the item of boiler and other repairs, amounting to about $550 a year. Fully sixty-five per cent. of these repairs are caused by incrustations, so that there would be a saving under favorable circumstances of $357 50.

But the gain is even greater than this. The conducting power of the incrustations is very low, and as, after four months, there will be, in the locomotives on most Western roads, a crust one-sixteenth of an inch in thickness, a much greater heat must be maintained to evaporate the water, than would be necessary if the water space remained unclogged. This extra use of coal is estimated to cost no less than $346 25 a year for one engine. The entire saving is therefore no less than $703 50, less the cost, $236 25. This gives a yearly profit per locomotive of $467.

The figures we have given are not the result of experience, for the method proposed has not yet been tried; but they are the conclusions of experienced and practical men. The question is one of especial importance to furnace men. The saving will, in their case, be confined to the item of repairs, for steam is now almost altogether raised with furnace gases. But if the simple arrangements suggested by the railway men accomplish their object, they will far more than earn their cost by removing, to a large extent, the risk of accident, as well as the annoyance of stopping for repairs. When a locomotive is disabled, it is only one part in the vast machinery of a road—its cost is but $25,000 to $30,000, and a few days stoppage of its activity is not such a serious matter; but if an accident occurs to the boilers of a furnace, or mill, not only is the interest on a much larger sum of money involved, but the consequences may be excessively troublesome. Accidents at furnaces appear to be happily rare, but that is no reason why furnace managers should not provide every known means for stopping them altogether. If, on the one hand, the furnace man gains but little by the prevention of boiler incrustations, because his fuel costs him nothing, he is, on the other, for the same reason, relieved from all expense except that of the plant, which is small.

For these reasons we recommend the iron masters either to make trial of these suggestions themselves, or at least to watch the proceedings of the railway men, and if anything reasonably successful is developed, copy it in their works.

Utah Smelting Works.

From the first monthly bulletin of the Utah Mining Bureau we learn that in June, 1872, the Territory of Utah contained no less than 22 smelting works, which had been erected at different times, from 1870 to the date of the bulletin. Of these, fifteen were finished by the summer or fall of 1871, and the other seven have been built since. With the names of the companies the bulletin publishes the amount of ore which each works can treat daily. The total is enormous. The fifteen works which were ready for running in 1871 had, according to the "correct and reliable information" of this bulletin, a capacity of no less than 258 tons a day. The remaining seven works, finished after 1871, can, we are told, treat 206 tons daily. In adding up this list, we have reduced one absurd estimate of 50 tons daily to 8 tons, and whenever a blast furnace is mentioned without its capacity being given, we have allowed it 8 tons. In this way, we have allotted 32 tons daily to four furnaces built before or in 1871, and 24 tons to three furnaces finished after that date. We should add that 8 tons is far below the average allowed by the bulletin to the shaft furnaces, and our total must be looked upon as very moderate, according to the figuring of that circular.

Utah, then, according to our reliable informant, is able to treat no less than 464 tons of ore a day. Counting that, with all the delays of work in the long winter season, at 100,000 tons yearly, and the yield at 30 per cent. lead and 75 dollars silver, we ought to have from that Territory 30,000 tons of lead and $7,500,000 silver; besides the product of the mills, heretofore one of the principal sources of the Utah silver. The returns for this year are too incomplete to enable us to judge of the yield, but we shall be surprised if the furnaces turn out 5,000 tons of lead, and of whatever lead is shipped, one mine yielding an ore easy to smelt and worth about 50 per cent. lead will furnish probably one-half. With all the furnace capacity of at least 100 tons a day in the beginning, and more than 200 tons a day by the mid-

dle of the season in 1871, the total shipments of bullion for that year, as given by this same bulletin, amounted to only 2,378 tons, representing about one-fifteenth of the Territory's powers.

To what cause shall we assign this fearful falling off? The iron business would call its condition pretty bad if but one furnace in fifteen were at work. In Utah there are a few furnaces which are badly situated and foolishly designed, but they form only a small part of the whole. There is but one reason which can possibly be given for the numerous failures there, and the great falling off in yield from capacity. That reason is ignorance of smelting. Capital is plenty, the ore lies in huge dumps awaiting the man who shall treat it sensibly, fuel can be had, and the Territory probably contains all the other materials necessary to success. But it lacks the men. The number of men who know anything about the smelting of lead ores is very small there, and what is really worse for the prospects of the Territory is that the miners and mine owners are often more ready to put faith in charlatans than in trained smelters. Men who do not know one lead ore from another, who cannot distinguish sulphur from granite, who don't know what roasting is meant for, nor what a flux is, can gain the ear of the mine owner much more readily than a practiced workman.

We are not writing wonders. There is in the life of the mine-hunter something which makes him, in the strictest sense of the word, the child of fortune. He knows that the finding of a mine is the result of hard physical labor, keen observation, and good luck, and give him the choice between a trained workman and an ignorant, but "lucky" prospector, and, we venture to say, his choice would always be for the latter.

With this there is no fault to find. The prospector only fulfills the lesson of his life. But when we see men, trained in the school of intelligent business, following in the footsteps of those to whom they ought to be superior, and trusting their affairs to men who have neither teaching, nor experience, nor ordinary intelligence, we confess we are not surprised that the ore of Utah mines still lies on the dump, where it has lain for years, and the 464 tons of our "correct and reliable" contemporary dwindles down to an actual daily run of perhaps 75 tons. We believe this state of things will speedily change. Utah will not take her proper position as a lead and silver producer with the rapidity that is in her power, but she will do it in time, and more rapidly than any other of the Western Territories except California.

In fact this condition of things has already changed to some extent, and, we believe, there are several works in the Territory where the furnaces are kept running. The shipment of bullion is steady, and though the losses in working are now, probably, very heavy, the men who are trying to teach themselves the science of lead smelting will learn in time.

But we strongly object to the publication of such 'bulletins" as that before us. As our readers well know, the mining bureau which issues it professes to give only correct information about the affairs of the Territory. But we venture to say that no person ignorant of the circumstances could take up the paper, published by this bureau, and gain a fair idea of the work going on there. There is nothing in the list of smelting works to indicate that most of them do next to nothing, that many, if not most, of the older works have been failures from the start, and that some, from their situation or other circumstances, must be failures to the end. The uninformed reader, gazing upon the list of works, would, without doubt, suppose that smelting is a great, successful and well established business, in Utah. That it will be such, in time, we have not the least doubt; but that it is such now, we think, no one will attempt to assert. In the pretension to science, exhibited in this bulletin, we see only vain ignorance, and in the statistics little that does not mislead.

EDITORIAL CORRESPONDENCE.

Physical Science at Iowa State University.

EN ROUTE, Nebraska, July 24th, 1872.

Attracted by curiosity to examine the details of the ingenious methods of instruction in physical science practiced in the Iowa State University, I have been spending a day in the quiet little town, Iowa City. The text books of Professor GUSTAVUS HINRICHS, who occupies here the chair of that department, and the various papers on the subject which he has contributed to scientific periodicals, at home and abroad, have attracted in no common degree the attention of the friends of scientific instruction in the United States. It is comparatively easy to talk platitudes about physical science, and to insist that it shall be made a part of college curricula; but the practical problem, how it shall be effectively taught, is not solved by such enthusiastic generalities. Lectures and "cramming" are more injurious here than in the departments of letters or classics; they not only fail to train the student, but they also establish him in mental habits absolutely inconsistent with scientific thought. Even the study of language is not attempted now-a-days without the practical exercise of the student at each step of his progress. It has been found that the best way of learning to talk, read and write in any tongue is to talk, read and write. It is in science only that instructors seem likely to act on the maxim of Mrs. Partington, and insist on Isaac's knowing how to swim before he shall go near the water. This absurdity is not altogether, however, the fault of educators. It has arisen from the dilemma in which they have been placed—forced, on one side, to satisfy, nominally at least, the demand of public sentiment for scientific instruction, and embarassed on the other side, by the difficulty and expense of obtaining complete apparatus, and satisfying with the necessary amount of time and space the requirements of this exacting and aggressive department. Lectures or text book recitations can be managed; but laboratories and instruments and room in the crowded curriculum, are not so easily obtained.

Professor HINRICHS was not the first, though one of the first, to insist that physics as well as chemistry should be studied in the laboratory, and that every law, principle and mathematical relation should be verified by the actual observation of the pupil. But he is the first to show how this can be done conveniently and efficiently, with simple and inexpensive apparatus, and for large numbers of students. It is not my purpose to describe his method minutely. Even after a day's earnest conversation with him, there still remain many questions in my mind unanswered, and difficulties unsolved, though I have no doubt they would be triumphantly explained had I suggested them, as were all other points raised by me during my visit. I am satisfied that the system is a practical success, and deserves to be widely imitated, at least for the purposes of elementary instruction, which is, after all, the only instruction that the greater portion of pupils will need or care to receive. We do not require that everybody shall become an analytical chemist, or an original investigator in physics. What we want is to give to all a practical acquaintance with the fundamental facts and laws, and, above all, of the methods, of modern science.

Prof. HINRICHS' laboratories show little imposing paraphernalia. The apparatus is simple and cheap, but devised with great ingenuity to serve the precise purposes desired. The following may be fairly called the principles upon which the system of instruction is based:

1. The pupil is expected to work from the beginning, as earnestly, honestly and carefully with simple apparatus, as though he were making advanced investigations with the most precise instruments.

2. All observations are journalized, tabulated, and compared with the more exact results obtained by calculation and experiments of authority. It is found that the mathematical relations of natural forces, for instance, the laws of harmony in musical tones, the speed of falling bodies, the chemical equivalents, etc., are experimentally determined by pupils with a high degree of accuracy. Yet the "instruments of precision" are nothing more than a pendulum, a water-clock (made of a bottle and a glass tube, and measures of length and capacity drawn on cardboard, or scratched on glass. It is by taking the mean of numerous observations, that the errors of the standards are eliminated.

3. The idea, that all scientific work is *quantitative*, pervades the whole course. Thus even in the primary study of chemical phenomena, the solution of the re-agents are so prepared that each drop of the solution contains a unit of the re-agent; and all dilutions are practised on the same principle, so that the pupil knows at each step what are the quantities before him, of the substance, whose qualities he is investigating. The use throughout, of the metrical system facilitates this, by avoiding the necessity of troublesome calculation.

4. In all chemical operations very small quantities are employed. Most of the qualitative reactions are studied in single drops of the re-agents. The double decomposition of salts, for instance, and the formation of precipitates, is shown for a whole group upon a single glass plate, a drop of each solution of the group being treated with a drop of the common re-agent towards which their behavior is to be tested and compared. How much is gained in rapidity, neatness and economy by this device those teachers will readily understand who have experienced the carelessness and waste—the *Schweinerei*, to adopt an expressive German word, which characterizes the operations of beginners in qualitative chemistry.

I examined a large number of the laboratory journals of the students, both in physics and in chemistry, and I am satisfied that this system (which must not be judged from my hasty description) is practically efficient. The defects of this account, may, perhaps, be pardoned, when I say that it has been scribbled in the railway car, under conditions which disturb the writer's balance of body so far as possibly to affect the mind. R. W. R.

Wire Tramways.

M. EVRARD, engineer of the Chatillon & Commentry Forges Company in France, has written a book upon the means of transport employed in mines and works, in which, according to the *Engineer*, he refers the origin of this system of transportation to the single line railway system of Palmer, patented not far from forty years back. Wire rope transports arranged in several different ways have also been for a considerable time in use in Belgium and France, as in the Collieries of the Sarthe. One arrangement has been employed by M. Coutant, for discharging coals from barges on the Seine into his metallurgic works. Another has for a very long period been designed by M. Balan, who has constructed several such for work in the quarries in Fontainbleau and elsewhere near Paris. At Pyrmont, in Savoy, the owner of the asphalte quarries there has long employed wire-ropes for bringing down his bags of raw materials from the hill-side above to his works on the Rhone—and near Modane the anthracite from the Alpine formations is brought down thus by a wire from the mouth of an adit, at a prodigious elevation above that town.

The invention, then, is not a new one, but it has been brought into greater prominence and attention from practical men than it ever before received, through the exertions of Mr. Hodgson, whose arrangements have been adopted as a branch of manufacture by MM. Cail & Co., of Paris. M. EVRARD gives us plates of those arrangements in his atlas, and a description, with the financial results attained by the wire tram, as employed by M. Lalouette & Co., the great beetroot-sugar manufacturers in France. From the illustrations it may be seen, that the use of the "aerial railway" as M. EVRARD

calls it is very wide. Indeed, an apparatus so simple, cheap and easily worked, may look for acceptance almost as great as the common hoist-way, or the machine lift.

About-Town Jottings.

BUSINESS AND PERSONAL.

Personal announcements and business notices inserted at fifty cents per line.

Root's Wrought Iron Sectional Boiler, manufactured by the Root Steam Engine Co., 500 to 510 Second Avenue, New York.

Utica Steam Engine Co. (formerly Wood & Mann Steam Engine Co.,) 42 Cortlandt street, N. Y.

Post & Goddard have removed to No. 111 Liberty street. Dealers in Taps, Dies, Reamers, Drills and supplies generally.

American Submerged Pump. Power attachment—cheapest and best in the market, 55 Chambers street, N. Y.

Roper Caloric or Hot Air Engine, 124 Chambers St.

Blake Bros., New Haven, Conn., manufacture Stone Breakers for crushing ores and minerals of every kind into small fragments, preparatory to their further comminution by other machinery.

The Niagara Steam Pump Works, 23 Adams street, Brooklyn, N. Y., are now working to their fullest capacity.

MINING SUMMARY.

We copy from the San Francisco *Herald and Commercial Review* of July 26 the following highly interesting quarterly MINING REVIEW.

MINING IN THE FIELD PROSPEROUS—CRASH IN STOCKS.

While the business of mining has been unusually active and prosperous, there has transpired during the past quarter one of the most sweeping and disastrous breaks in the stock market that has yet occurred in the history of these transactions on this coast. The general appreciation of shares, incited last winter through favorable developments made in certain of the Washoe mines, having culminated near the middle of the quarter, was at once followed by a decline rapid and extreme, many stocks receding to points as much below as they had before been in excess of their intrinsic value. During this period of inflation, numerous properties of little value were listed on the Stock Board and thus brought into ephemeral notice, only to disappear when the crash came and never more to be heard of except through calls for assessments or the complaints of credulous purchasers; while, on the other hand, stocks of real merit, forced down momentarily by the panic, have, with its subsidence, again begun to appreciate, some having already recovered from its effects and even advanced to higher figures than they had reached before. While it must be conceded that almost everything was rushed to an extravagant price during the late excitement, it is still a fact that the valuable discoveries recently made, not only in the lower levels of the Comstock Lode, but throughout all parts of our gold and silver-bearing fields, have begotten a confidence in this branch of industry that will serve to rally most drooping stocks and even insure for many of them a marked appreciation in the early future. These swelling prices are based on an intelligent conviction that the business of mining, vitilized by abundant capital and aided by the numerous economies now being introduced, must soon yield far better results than have yet been obtained, to say nothing of the still greater gains that may be expected to attend its maturer years.

THE PRODUCT OF THE PRECIOUS METALS

on this coast, the past quarter, has exceeded that for any like period in our history, having been at the rate of over a hundred million dollars per annum. Among other causes tending to favor this large production, may be mentioned the full supply and prolongation of the water season, due to the heavy fall of snow on the Sierras the past winter, and to increased facilities for preserving the water, formerly suffered to run to waste, and conducting the same to points where required for use. To this end numerous ditches and reservoirs, some of them of large capacity and very costly, have been constructed of late, affording means for washing in many new localities and extending the season of active operations in others. Among enterprises of this kind completed and brought into use during the quarter, we have the great La Grange Ditch, in Tuolumne County, bringing water upon the extended gravel range about the town of La Grange, starting into life a new business at that point and giving employment to a considerable population; also, the Rough and Ready Ditch, in the same county, carrying water upon the rich Table Mountain claims above Peoria, where large and profitable operations are now being carried on. In the meantime, the several capacious canals undertaken by the Hendricks, the Spring Valley, and other companies in the neighborhood of Cherokee, Butte County, the gigantic tunnel at the Devils Elbow, and the large ditch and flume at Indian Creek, Plumas County, with numerous works of a similar character in other parts of the State, have been pushed ahead with energy, several of them having recently been brought to final completion; while the vast hydraulic schemes of Col. Von Schmidt, Capt. Battersby, and other projects of the kind are being advanced with all the expedition possible, in view of their costly and complicated character, and great magnitude.

With so much progress in this class of improvements, there has been.

A GENERAL RESUMPTION OF ACTIVE OPERATIONS

on many claims in this State upon which work had for a long time languished or been wholly suspended. The famous and once largely productive Soulsby mine, in Tuolumne County, for several years unworked and filled with water, having passed into the hands of an English company, is now being resuscitated, and will soon be once more in course of successful operation. Powerful machinery, built at the Miners' Foundry in this city, has just gone forward, and will in the course of a few days be in place on the claims of the Great Blue-gravel Range Company, at Todd's Valley—a property long neglected, though unquestionably one of the most valuable in the State. With means for ridding their underground works of water, it will be matter of surprise to all early miners in that neighborhood if the company fails to realize extraordinary results at that point. Work has also been renewed on several of the old Table Mountain claims and along many of the ancient river channels, as well as on numerous long-slighted or wholly forsaken lodes of gold-bearing quartz—multitudes of miners having this year returned to wash again the river bars, tailings, and other deposits, already many times worked over, showing how great a revival of labor has taken place in this direction. Public attention has even been awakened, during the past few months, and is now being strongly turned toward the onced-famed, but long since nearly forgotten

GOLD BLUFFS AND BEACHES,

along our nothern coast. For a year or two, there had been growing rumors of new and extensive discoveries in that quarter, to some of which was assigned such grave importance as induced parties here to construct a sub-marine apparatus, and fit out a vessel for the purpose of collecting the auriferous sand, supposed to exist at favorable localities beneath the water a little way from shore. This vessel will soon sail for its point of destination, somewhere in the vicinity of Gold Bluff, where it is to be anchored just outside the surf, this having been found by previous examination to be the line of the richest deposits, the gold here being too coarse to be carried up by the surging waters and left on the strand, as happens with the lighter particles. This company, who have expended large sums in preparing for operations, claim to have examined the ground with care, and to be acting on a safe basis. Their mode of procedure consists in first prospecting the bottom with a diving bell, when, a suitable place for work having been fixed upon, the gold-bearing sand is to be brought to the surface through a flexible tube by the power of suction. From this sand it is proposed to separate the gold by washing through a sluice rigged on deck, salt water being used for the purpose.

Within the past few weeks, other parties from San Francisco have visited certain of these deposits in the neighborhood of Port Orford—these being a short distance inland, and along what was once a shore-line. They found the stratum of auriferous material here to vary from two to six feet in thickness, running back under the sand-hills a distance of several hundred feet, and extending for miles up and down the coast. It can be reached and gotten out only by tunneling—a tedious and costly method of extraction, the ground being full of water and necessitating much heavy timbering. Nor is it everywhere that the sand will pay for working, this point having to be determined by careful prospecting. The surrounding country is covered with heavy forests, and, what is worse, everywhere obstructed by a dense undergrowth and immense masses of fallen timber, through which trails have to be cut with great labor. This party, after purchasing some claims and starting a tunnel, have returned to the city, favorably impressed, yet not oversanguine, with the prospects in this new field of labor.

What is likely, however, to give additional consequence to this branch of mining, is the fact that these gold-producing sands carry everywhere a large percentage of

MAGNETIC IRON ORE,

In the form of a black sand, from which a superior quality of steel can be produced—as has been shown by successful experiments made in Australia. Great quantities of this sand have been collected there in the process of washing it for gold, and manufactured into the very best of iron. Competent metallurgists in this city who have investigated the subject, are of the opinion that these auriferous sands can be made more valuable for the iron than the gold they contain. This black sand, when separated from all other substances, carries 75 per cent. of metallic iron, and can easily be smelted when mixed with the materials necessary to flux it and prevent its being carried away by the force of the blast after being placed in the furnace. Iron in this market now commands extremely high prices, refined cast-steel being quoted at $305 per ton, a quantity that, according to the above estimate, could be made from less than a ton and a half of this ore. While we have been able to produce on this coast all the other metals in excess of home requirements, we have not yet succeeded in supplying ourselves with iron, the most important of all—a deficiency which this new source of the raw material may yet possibly enable us to meet. The operations revived and new enterprises commenced on

THE GREAT MOTHER LODE OF CALIFORNIA,

As noticed in our last Quarterly Review, have, with some additions made to their number, since been carried vigorously forward, much capital and labor being now employed in developing the mines situated along this great mineral belt. Commencing on the north, we have the original Amador, now owned in London, with a forty-stamp mill just completed, and possessed of large and excellent ore supplies, entering apparently upon a very prosperous career. The Keystone lying next, with a first-class mill, is turning out from $40,000 to $60,000 monthly, over half of which is net profit. Then comes the Amador, formerly the Hayward, also owned mostly in London. Operations here have lately been interrupted by fire, destroying the hoisting works and the upper part of one of the shafts; but the company have a larger body and a higher grade of ore in their lowest levels—1,300 feet down—than they had at any point above. Coming south, the Oneida, the Kennedy, and the Gwin mines are all being worked with energy and doing well, the yield being larger than ever before. So, too, at Angels, everything is prospering, the clouds that so long hung over this camp having at length passed away. A new and better era is about being inaugurated at Carson Hill, the very centre of the Great Mother Vein, Mr. Gabriel Stevenot, principal owner of the mines there, having about consummated arrangements in England looking to developments on a scale commensurate with their magnitude and value. Continuing south a distance of four miles, we find the lethargy so long-prevailing at Rawhide Ranch and the Harris mines—both first-class properties, about giving way to the all pervading spirit of activity. At the Dutch, the Heslop, and the App, a group of fine mines two miles further south, everything is astir—sales being effected, shafts going down, the ore bodies improving, and matters altogether in a satisfactory condition. Taking them in their order, we have next the Shawmut, Eagle Gulch, Orcutt, and Clio mines, over which unbroken idleness for years had reigned, but which having lately passed into the hands of men of larger means and firmer faith, are now being explored with system and energy. The Louisa and the Virgin claims, recently bought by San Francisco capitalists, are also being sunk upon at several points, while a mill and other improvements go up on the McAlpin, an adjoining mine, already somewhat opened. The owner of the Pina Blanca, one of the best properties on the Mother Lode, having negotiated the means for resuming work and prosecuting the same on an extended scale, this too will soon be the scene of awakened and profitble industry. Upon several of the leading mines on the Fremont estate, at the southern extremity of this immense ore-bearing channel, work has already recommenced, establishing a line of active exertion from one end of the great dominating vein to the other; and it is not too much to say, that we believe the money expended at these several localities will be as likely to insure satisfactory returns as investments made at points more remote. Indeed, our more sagacious capitalists are disposed to give this State a preference over every other part of the coast as a field for mining enterprise, it being considered by many that the Mother Lode presents greater inducements just now than any other portion of

California for the investment of money. With English capitalists, our

DEEP GRAVEL MINES,

both hydraulic and drift, are growing in favor, their investments here having generally been fortunate, at least more so than those made in the silver mines of Utah and Nevada. The North America group of drift claims, sold last spring to parties in London, is likely to prove a lucky purchase, the value of this property turning out to be vastly greater than either the buyers or sellers had reason to suppose; and had the transfer been effected before the working season was so far advanced, the returns already realized would have been such as to astonish all parties. As it is, these mines, under the capital management of Superintendent Morgan, will yield handsome profits for the current year, and be placed on a footing to insure the most gratifying results hereafter. In the San Francisco market these claims would bring to-day twice what they sold for.

In the purchase of the Sweetland Creek and the Bird's-eye Creek hydraulic grounds and accompanying ditches, our English friends also made a happy hit, getting good properties at a moderate figure and securing a first-rate management at the same time. The Little York property, consisting of ditches, timber lands, and hydraulic mines, also reported to have been lately sold in London, will prove a good investment, the price being low and this one of the most valuable estates in California. Encouraged by these fortunate ventures, British capitalists are putting money freely into various other kinds of property in the State, including some of our larger water ditches, several of which have recently passed into their hands.

In the way of recent discoveries,

THE SCHELL CREEK MINES,

give us something noteworthy to announce for the quarter just closed. Although the first discoveries made in that neighborhood date back several years, not until the snow upon the mountains disappeared last spring was the great wealth of the country made fully apparent. With a most extraordinary display of rich ores on top, the developments made indicate for these mines a good degree of permanency, the ore bodies, so far as opened, holding in depth and most of the larger veins giving evidence of being lodged in true fissures. The region in which they are situated is accessible, pleasant and healthful, and withal well conditioned for the cheap production of the precious metals, abounding beyond all other parts of the State in wood, water and grass, and possessing a large area of good farming lands. Everything considered, the outlook at Schell Creek is highly encouraging, there being little doubt but many valuable mines will be developed there at an early day. Even now, some of the properties there may justly claim to rank as such, considerable quantities of high grade ore having been taken from them with hundreds of tons still in sight. In the McMahon claim, sold for $30,000, enough ore has been uncovered at a depth of only fifty feet to more than reimburse the outlay of the present owners, and it seems probable that the prospecting works here will, in most cases, yield a sufficiency of ore to cover the cost of their construction.

A good many of our people have become interested in Schell Creek, and, but for the recent break in stocks, a large amount of San Francisco and Nevada capital would have sought investment there. Among the more enterprising and far-seeing of our moneyed men who have embarked largely of their means in that section is J. P. Jones, the Gold Hill millionaire, who has extended to many of the miners there a helping hand in the hour of their sorest need. Several mines have also been bought on English account, with still a few others secured for parties in the Eastern States.

Developments on the mines, as well as most other improvements in Schell Creek, have been greatly retarded, through

THE SCARCITY OF LABOR

prevailing now throughout all parts of our Pacific States and Territories. So stringent has this demand become that a material advance of wages has failed to insure to either farmer or mine-owner the requisite supply of labor. As a consequence, many interests are suffering, the product of the mines in some localities having been seriously curtailed, even after recourse had to Chinese labor, where this happened to be within reach, or employers have been suffered to avail themselves of its aid, an alternative they are not always left free to choose, even in so great a dearth of the labor markets. Complaints reach us from various quarters that the whites will not allow these people to be engaged in the mines, even as hirelings, without harassing and sometimes shamefully abusing both them and their employers. Just now we know of many companies that are working a greatly reduced force on that account, running perhaps not more than thirty or forty hands where a hundred or more might otherwise be employed to advantage. The superior race are receiving at the present time liberal wages—from $2 50 to $4 per day in gold—more than double the price paid these Asiatics, who are generally placed in subordinate positions and made to perform tasks that the others would not always care to do. Such conduct on the part of the latter is therefore not only wholly inexcusable, but in every respect mean and unjust.

With the exception of this scarcity of labor and some tightness also in the local money market, growing out of the late revulsion in stocks, the business of mining has encountered no serious obstacles or drawbacks during the past quarter, having, on the contrary, been freer from these than usual, and almost everywhere proved remunerative and productive.

Another volume of

MINING STATISTICS,

from Commissioner RAYMOND, has just made its appearance. It contains a large amount of information touching the mines and mining industries in the regions lying west of and adjacent to the Rocky Mountains; the subjects of our mineral deposits, metallurgical processes, mining laws, bullion product, and a variety of kindred topics being treated of in an intelligent and practical way. For much of the matter relating to this State, Commissioner RAYMOND acknowledges his indebtedness to Mr. WALTER A. SKIDMORE, who, for several years, has aided him in this capacity, doing his work thoroughly and well. This volume contains nearly six hundred pages, and is especially valuable for the views expressed in regard to a suitable code of laws regulating the disposal of our mines and the manner in which they should be previously held and worked.

Nevada.

FROM OUR OWN CORRESPONDENT.

EUREKA, NEVADA, July 30, 1872.

TO THE EDITOR.—A few weeks ago I visited several old mining districts, 75 to 130 miles west and south-west of this place, and happening to meet with persons I could rely upon, I obtained some interesting information in regard to the mines of other sections which I could not visit.

TWIN RIVER DISTRICT.

A San Francisco Company is vigorously at work on the Murphy Mine. The old incline has been deepened about seventy feet and some good ore is in sight, but most of the rock coming from the bottom is a low grade quartz mixed with slate. Owing to the hardness of the ground and the fact that a considerable amount of water has to be raised part of the way by hand pump, the sinking work does not progress very rapidly, but the company is resolved to see what there is below. In some of the old levels there are small bodies of pay-ore available, and the mill has recently made a satisfactory, though short run. Persevering judicious development can scarcely fail to make the Murphy a property of great value and permanence.

SILVER BEND.

The Philadelphia district so well known under the above name a few years ago, is again the centre of mining activity. A tunnel run into the hill near the Arizona mine gave each of the owners of the Monitor Lode a fortune, and made all the old locations in the vicinity worth round sums of money. The first class ore found in the tunnel assayed several thousand dollars, and shipments to the mills required very little assortment to keep the value up to three and four hundred dollars per ton. As the ore bodies all seem to dip off towards the south, they will probably be found at a greater depth in the works of the Eldorado south which is known to be on the same lode. Work has been resumed on the mines of the Combination Company of New York with astonishing results. A few feet of drifting in one of the old levels exposed a large chimney of very high grade ore. The Superintendent to whom it appears the company was owing some money is now extracting the ore to pay himself and will soon have a large surplus on hand. I hope the early owners, notwithstanding their blunders and misfortunes, will yet realize handsome dividends from these mines. They certainly have a fine property, and little else than good management is necessary to make it productive.

FREIBERG DISTRICT,

lying about 130 miles south of White Pine, has attracted considerable attention of late, owing to the highly satisfactory development of the Mining Star Lode. This property was purchased conditionally, last Fall, by Judge C. C. Goodwin and others for $30,000 in gold. It has been opened 200 feet deep by an incline in ore all the distance, and the width of the seam is not yet known. The average grade of this ore is from $80 to $100 in silver, and it is rich in lead. The outcrop of the vein was in limestone, but that kind of rock has been gone through in sinking and a porphyry formation reached. A substantial furnace of forty tons capacity has been built, and a Hallidies wire tramway, 1,200 feet long, is in complete working order, two men being able by it to deliver at the furnace 100 tons of ore every twelve hours.

The property I understand is likely to pass into the hands of a rich company and will probably soon become largely productive.

THE ELY MINES.

For steadily increasing productiveness, the mines at Pioche seem to be far ahead of those of any other district east of the Comstock. From returns kindly furnished me by the Secretary of the Raymond & Ely Mining Company, I find that while the gross product for 1871 was $1,310,494, from the 1st of January to the 21st of July of this year, it was $1,910,811 85, making the average daily yield as given below.

January,	1872	$5,799 53
February,	"	6,836 35
March,	"	10,321 85*
April,	"	10,590 34
May,	"	10,815 80
June,	"	10,959 87
July, (to 21st,)		10,970 38

The following dividends were paid to shareholders during the same period.

		Per share.	
January,	1872	$3	$ 90,000
March,	"	5	150,000
April,	"	7	210,000
May,	"	7	210,000
June,	"	7	210,000
July,	"	7	210,000
			$1,080,000 gold coin.

The dividends paid during 1871 were $615,000. From January, 1871, when the company was incorporated until the present date there has been a gross bullion product of $3,221,306 06. The cost of mines, building mills, and carrying on the works has been $1,293,089 56, which added to the dividends leaves $200,000 cash on hand. The Raymond and Ely has never been a fancy stock with the "bulls" and "bears," as the powerful shareholders were determined from the beginning to follow mining as a legitimate business, and not as a gambling operation. With the selling price of the stock at $140 per share, the dividends are paying 5 per cent, per month as interest—a return which ought to satisfy most of the owners.

The Meadow Valley Mining Company, also in Ely District has received $755,429 54 in bullion, and paid out since January last in dividends $300,000.

A district which having been almost uninhabited three years ago, can now show such gratifying results, is certain to attract more than usual attention.

NEVADA AHEAD.

According to the accounts of Wells, Fargo & Company, as published in the San Francisco *Bulletin*, the bullion produced in the Pacific coast States and Territories for the six months ending June 30th, amounted to $32,019,444. Of this sum, Nevada yielded $13,133,732, as against $13,120,243, the product of California. In a few years, Nevada is certain to double the harvest of the precious metals, and California is so linked to her destinies by numerous industrial ties, that she is likely to be the greatest gainer of the two in actual wealth by the progress so attained.

EUREKA DISTRICT.

I had some notes to give you of our mines and furnaces here, but my letter being long enough already, I must end for the present. JOHN DARE EMERSLEY.

Idaho.

The Owyhee *Avalanche* of Saturday July 13 has the following Local Mining Record.

At the Minnesota they seem to be sanguine of getting a fine body of ore in the 2d level drift south. The shaft is down about 45 feet for the 4th level. South Chariot mill is crushing the ore.

The Ellmore shaft is down 30 odd feet for the 8th level, and the south drift is in about the same distance from the winze, 134 feet north of the shaft. The north drift is something over 60 feet from the winze. The foreman expects to connect the shaft and the winze, August 1st.

W. B. Knott continues working his mine on Florida Mountain.

* New 30 stamp mill started.

The Mahogany is doing well. Elmore is crushing the ore at the rate of 25 or 30 tons per day. They have a fine vein of ore in the winze below the 5th level, which is down 70 feet, shaft is down 35 feet for this level. This mine is in the best condition of any in camp and they keep it well opened ahead of the stopes.

The Empire hoisting works are not all here yet. This s bad, as it keeps the work back. But they have commenced drifting from the bottom of the shaft, hoisting with windlass power, not very hard running. Ledge good and fully two feet wide.

The South Chariot mine has not changed in appearance much since our last issue, sinking the shaft being the only important work going on, and it is now down 80 feet below the 4th level. The vein in the shaft still continues downward on its regular incline. The South Chariot has one of the best shafts in camp.

It is reported that J. F. Sullivan has struck a large and rich gold bearing quartz vein in Jacop's Gulch.

Supt. Fassett has been having a crushing of Elmira Empire at the Cosmos mill this week.

Revenue booming away.

Advertisements.

The special advantages of the ENGINEERING AND MINING JOURNAL, *as a medium for advertisers, are so great and so widely known that it may seem almost needless to call attention to them. It is extensively circulated among the engineers of the country and takes a position in this respect before any other publication of the kind. It has a large and constantly increasing circulation among miners and mine owners, and men connected with mining operations generally. As it is the only paper in the country that makes this subject a specialty it has this field entirely to itself, and is the only direct and reliable means of reaching this class of persons. Being kept on file by almost every subscriber, it is doubly valuable as a permanent means of keeping an advertisement before the public. It is the Organ of the* AMERICAN INSTITUTE OF MINING ENGINEERS, *and is regularly received and read* BY ALL THE MEMBERS AND ASSOCIATES *of that large and powerful society,* THE ONLY ONE OF THE KIND IN THIS COUNTRY. *It is therefore the best medium for advertising all kinds of machinery, tools and materials used by engineers or their employees. It is the recognized organ of the coal trade, and is taken extensively by the trade throughout the country, and presents the very best means of reaching that very important class of men.*

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The rates of advertising, compared with those of other weekly industrial publications, are very low, especially when the class of consumers among which its large circulation is almost entirely confined, is taken into consideration.

Back Page.....40 cents a line.
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MISCELLANEOUS.

THE STOLBERG MINING AND SMELTING CO.

AIX LA CHAPELLE, RHENISH PRUSSIA,

has requested their undersigned agent to negotiate for either consignments or the purchase of American Lead and Zinc Ores. Parties in possession of such ores may find it to their advantage to address for particulars to

W. PAULSEN.
P.O. Box, 5,292, New York.

jy23:2m

BLAST FURNACES
FOR LEASE
AT MOUNT SAVAGE, MARYLAND.

The UNION MINING COMPANY, Proprietors of the old MOUNT SAVAGE IRON CO., offer for lease their Blast Furnaces (two) of 13 and 16 feet bosh respectively, capable of producing 300 tons per week. The situation of these Furnaces in the heart of a country offering coal and limestone of the best quality at the lowest cost, and within short and cheap reach by railway connection of the ore-beds of Pennsylvania, presents to capitalists a favorable opportunity for investment. Within a few weeks a thorough connection by rail between the Furnaces and Philadelphia and New York will be completed. For terms apply to

JAMES S. MACKIE, President,
71 Broadway, New York.
or JAMES A. MULLHOLLAND, Vice President,
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SUPERIOR RAIL MILL.—CAPACITY: 1,000 TONS PER WEEK.

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Our central location enables us to draw from both sides of the Allegheny Mountains Metals and Ores best adapted for making a No. 1 Rail, and together with our Improved Machinery, are a sufficient guarantee of our ability to produce Rails of a quality unsurpassed for durability and strength, by any foreign or domestic manufacture.

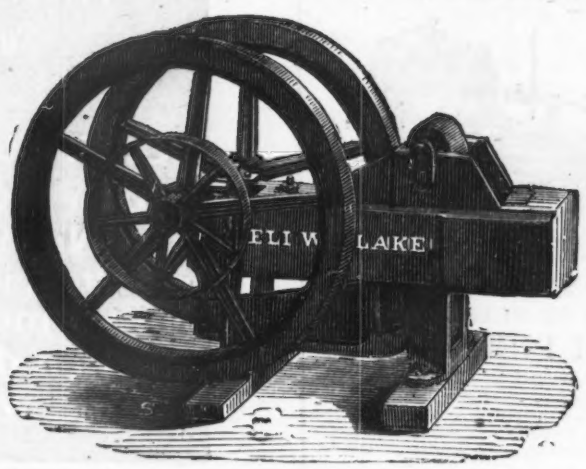
New Patterns, of any desirable weight, made to order on Short Notice.

We respectfully solicit orders for New Rails, or Re-rolling.

June 25.1y

MISCELLANEOUS.

BLAKE'S STONE BREAKER.



The office of this Machine is to break Ores and Minerals of every kind into small fragments, preparatory to their further comminution by other machinery.

This machine has now been in use, enduring the severest tests, for the last ten years, during which time it has been introduced into almost every country on the globe, and is everywhere received with great and increasing favor as a labor-saving machine of the first order.

Illustrated circulars, fully describing the machine, with ample testimonials to its efficiency and utility, will be furnished on application, by letter to the undersigned.

☞ The Patents obtained for this machine in the United States and in England having been fully sustained by the courts, after well contested suits in both countries, all persons are hereby cautioned not to violate them; and they are informed that every machine now in use or offered for sale, not made by us, in which the ores are crushed between upright convergent faceson jaws actuated by a revolving shaft and fly-wheel, are made and used in violation of our patent.

Mch. 14-1y. **BLAKE BROTHERS, New Haven, Conn.**

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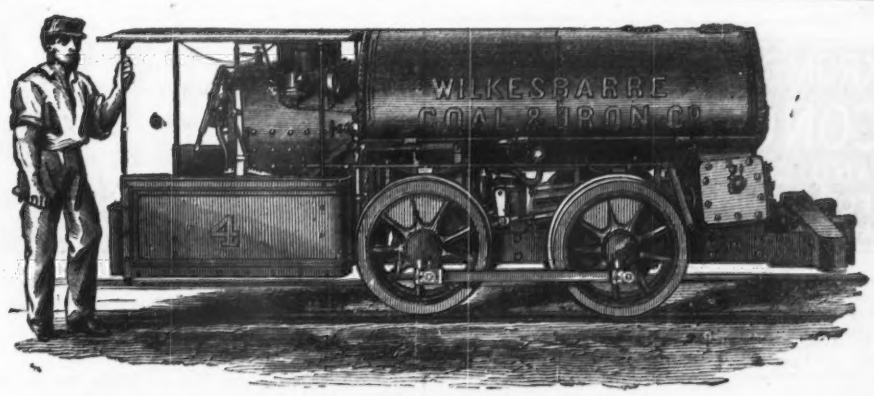

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Materials and Workmanship Equal to those in Full Gauge Railroad Locomotives.

Guaranteed to pass curves of twenty-five feet radius and haul on a level track in good condition

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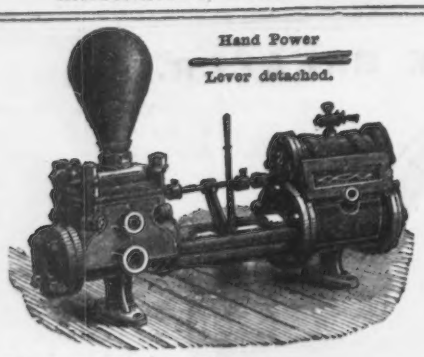

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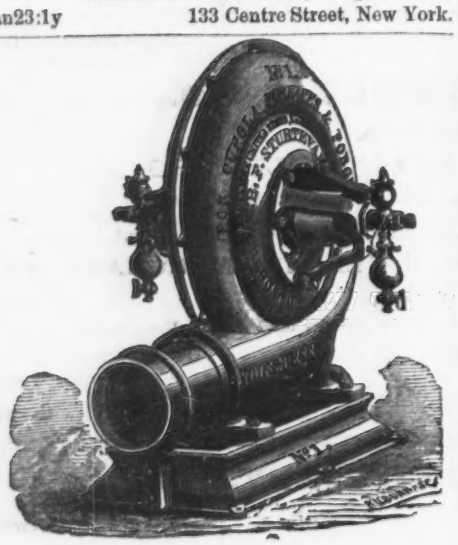

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CONCENTRATOR
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FOR CRUSHING SCREENING
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Minerals and Ores in which the difference of specific gravity s so slight and which are also sometimes in such fine particles as to defy separation by any other machinery or method, are rapidly separated by this Concentrator.

Mr. W. Bement, of Georgetown, Col., concentrating Silver ores, says: "I am satisfied your machines can not be beaten; they are simple, require no power (comparatively,) and do not get out of order."

A comparison is challenged between the results obtained by the approved methods of water concentration and the complete system of dry-ore concentration in the amount of ore saved, quantity concentrated, economy of working, and comfort of the operators and workmen.

Parties interested in mining are invited to call at No. 210 Eldridge street, New York, where they may see a machine in operation and have samples of their own ores crushed and concentrated.

For information and circulars, apply to
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MISCELLANEOUS.

The Bessemer Steel Works,
of John A. Griswold & Co.
Troy, N. Y., May 3, 1872.

B. F. Sturtevant, Boston, Mass.,

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BARNEY MEE, Supt.

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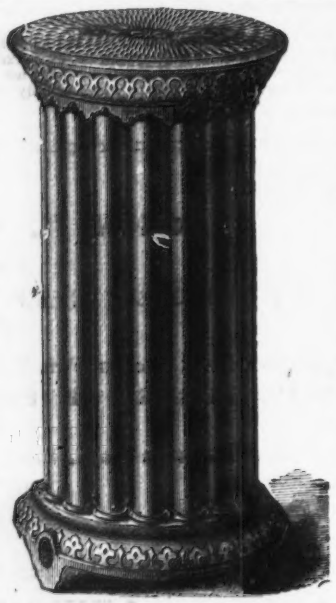

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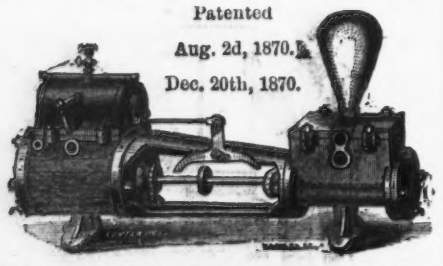

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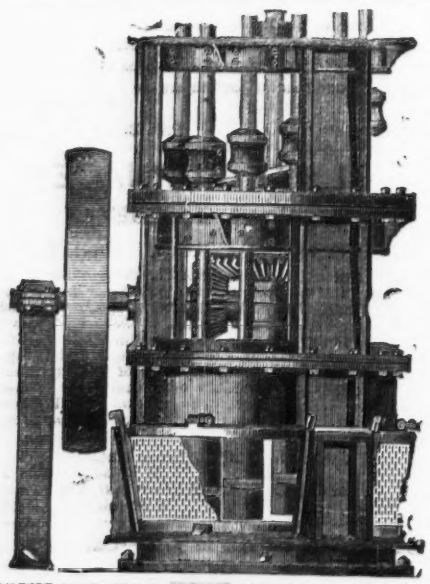

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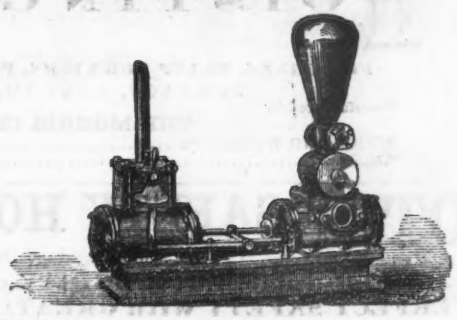

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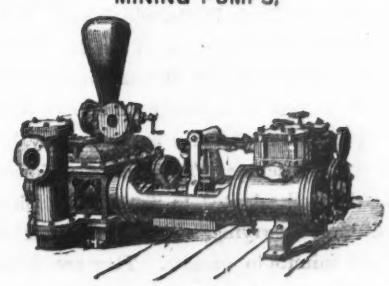

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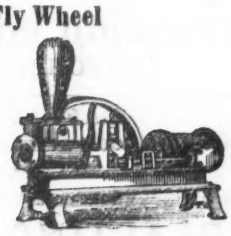

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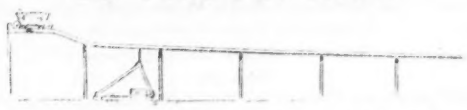

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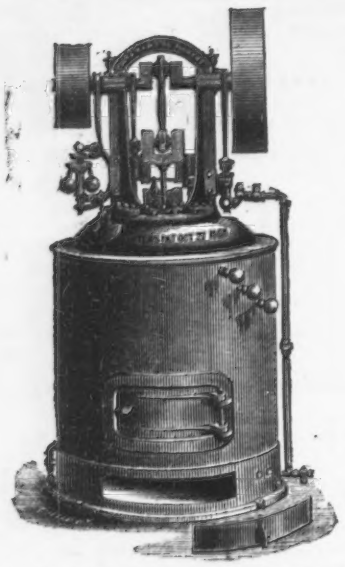

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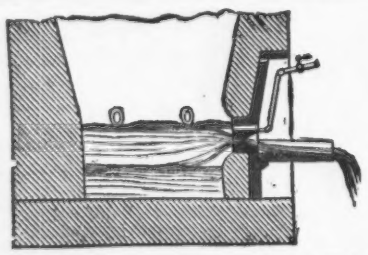

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